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U.S. ENVIRONMENTAL PROTECTION AGENCY

TECHNICAL ENFORCEMENT SUPPORT  
AT  
HAZARDOUS WASTE SITES



CONTRACT NO. 68-W9-0007  
TES X

**Metcalf & Eddy, Inc.**



ENVIRONMENTAL PROTECTION AGENCY  
TECHNICAL ENFORCEMENT SUPPORT  
AT  
HAZARDOUS WASTE SITES

TES X

CONTRACT NO 68-W9-0007  
WORK ASSIGNMENT # C07002  
EPA SS/ID NO. 7PL4

REVIEW OF WOODWARD-CLYDE CONSULTANTS  
DECEMBER 1992 QUARTERLY GROUNDWATER  
MONITORING REPORT  
AT  
ORTHO-CHEVRON CHEMICAL COMPANY  
IN  
MARYLAND HEIGHTS, MISSOURI  
U.S.EPA REGION VII

METCALF & EDDY, INC.  
PROJECT NUMBER: 270002.0002.003

WORK PERFORMED BY:  
TETRA TECH, INC.  
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PROJECT NUMBER: TC-4802

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## TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION . . . . .	1
2.0 REVIEW OF WCC DECEMBER 1992 QUARTERLY GROUNDWATER MONITORING REPORT . . . . .	1
3.0 DISCUSSION OF ANALYTICAL DATA . . . . .	2
4.0 CONCLUSIONS . . . . .	12

## APPENDICES

Appendix A	Historical Groundwater Data from the Ortho-Chevron Facility
Appendix B	Cross-Sections Annotated with Compounds Detected in 1992

## 1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Work Assignment Manager (WAM) requested the Technical Enforcement Support (TES) X Contractor review the Woodward-Clyde Consultants (WCC) December 1992 Quarterly Groundwater Monitoring Report for the Chevron Chemical facility in Maryland Heights, Missouri. This review was performed as part of the tasks assigned under the TES X Contract Number 68-W9-0007, Work Assignment C07002.

In December 1992, groundwater samples were collected by WCC at the Ortho-Chevron facility for analysis of selected herbicides and pesticides, Target Compound List (TCL) volatile organic compounds (VOCs), and total and dissolved arsenic. Sample splits were collected by Tetra Tech for the U.S. EPA on selected wells and analyzed for VOCs, semi-volatile organic compounds (also referred to as Base/Neutral/Acids or BNAs), pesticides, herbicides, total metals, and dissolved metals. The selection of wells (and analyses) by Tetra Tech and the WAM was based on the presence of contaminants as indicated by the historical groundwater data. For information on the collection of the split samples, refer to the TES X report dated December 29, 1992. The TES X review of the Environmental Services Assistance Team (ESAT) report on the U.S. EPA sample splits was submitted to the U.S. EPA on March 29, 1993. The data submitted by the U.S. EPA Region VII Laboratory along with the ESAT report did not include the data for the duplicate sample collected from well OWC-6. Those data have been received and are incorporated into this report.

## 2.0 REVIEW OF WCC DECEMBER 1992 QUARTERLY GROUNDWATER MONITORING REPORT

The revised format for the WCC data tables, which was first introduced in September, makes the data comparison to the report text much easier, and less errors were apparent in the September and December 1992 quarterly reports than in the 1991 - 1992 Annual Report (October). The following are specific comments related to the review of the WCC December 1992 Quarterly Groundwater Monitoring Report.

- o In Section 4.1.4 (page 4-3), it should be noted that three of the four wells in which arsenic was detected contain concentrations in excess of the 50  $\mu\text{g}/\ell$  Maximum Contaminant Level (MCL).
- o In the second paragraph of Section 5.0 (page 5-1), there is a probable typographical error. The correct maximum lindane concentration in "other" onsite wells is 2.3  $\mu\text{g}/\ell$  (well OWC-3). It is also noted that WCC now specifically identifies wells with lindane concentrations in excess of 20  $\mu\text{g}/\ell$  rather than the previous criterion of 25  $\mu\text{g}/\ell$ ; this concentration is greater than two orders of magnitude over the 0.2  $\mu\text{g}/\ell$  MCL for lindane.
- o The trend line for the lindane concentrations for well OWC-27 in Figure 2A (referred to in the third paragraph of Section 5.0 of the WCC report) appears to be a very poor fit. This is probably due to the fact that lindane has not been detected recently, as well as to the low concentrations at which it previously had been detected. Thus, this plot is not very useful.
- o As was noted for the review of the September 1992 Quarterly Report (review dated March 9, 1993), the revised summary tables do not indicate that all Target Compound List (TCL) VOCs were analyzed, and only those detected (or selected for inclusion in the table) are reported. Nor is the TCL list

provided by WCC as it had been in previous reports. Thus, a reader unfamiliar with the historical reports would not be aware that additional (TCL) VOCs were analyzed but (presumably) not detected. This should be clarified in future WCC reports.

- o The detection limits for 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone - MIBK) for wells OWC-16 and OWC-26, and for the field blank ("OWC-52") are reported as being 5  $\mu\text{g}/\ell$  on Table 1. For most of the well samples listed in Table 1, the MIBK detection limit is reported as 10  $\mu\text{g}/\ell$  (twice the 5.0  $\mu\text{g}/\ell$  detection limit for most of the other VOCs). This suggests that the detection limits reported for MIBK in these three samples are typographical errors.
- o It is also noted that the arsenic concentrations in wells OWC-6, OWC-8, OWC-14, and OWC-17 are comparable to historical concentrations, unlike the concentrations reported in September which appeared to be in  $\text{mg}/\ell$  rather than  $\mu\text{g}/\ell$ . If the data for September were incorrectly reported, a correction from WCC would be appropriate so that the historical data tables can be rectified.

### 3.0 DISCUSSION OF ANALYTICAL DATA

In order to facilitate a comparison of the data presented in the WCC Annual Groundwater Monitoring Report (October) and the data from the U.S. EPA June 1992 split samples with the data from previous years, the TES X Contractor prepared summary tables of the WCC data for each well showing the annual minimum and maximum concentrations of contaminants of concern. These tables, located in Appendix A, are based on available data from 1981 to the present, and were obtained from the WCC Site Characterization Report (February 1988) and various Annual or Quarterly Groundwater Monitoring Reports. Data for the U.S. EPA split samples are from the ESAT or U.S. EPA Region VII Laboratory reports on the U.S. EPA split samples collected in 1990, 1991, and 1992 and are tabulated separately. These data represent Ortho-Chevron information that was readily available to the TES X Contractor and may not be complete.

These tables are continually revised as more data become available. Beginning with selected wells in December 1990, WCC has indicated that VOC samples were analyzed for the Target Compound List (TCL); however, only xylenes and compounds detected are listed in their tables. Detection limits are provided only when a compound was detected in another well listed on that table. Thus, TCL compounds that are not on WCC's analytical data summary tables are shown on the historical tables as being undetected, but detection limits are not known. This same assumption is made for the September and December 1992 data, although it is not clear from the WCC report whether TCL compounds not listed in their tables were analyzed but not detected.

Three previously prepared east-west cross-sections and two new southeast to northwest cross-sections have been annotated with the chemical compounds detected in 1992. The site map and these cross-sections are included as Appendix B. The cross-sections were prepared based on WCC's 1992 site map. The well locations and distances differ somewhat on the 1993 map. For instance, the distance from well OWC-27 to OWC-15 is approximately 380 ft on the 1992 map, but only approximately 330 ft on the 1993 map. Due to variations between the two maps, both are annotated with the cross-section locations. The cross-sections will be revised based on the 1993 WCC map at a later date.

The following is a brief summary of the data for each well.

Well OWC-1      The December 1992 analyses indicate that no contaminants (other than the common laboratory contaminant acetone) were identified in this upgradient, shallow well. Historically, traces of lindane were detected in 1981 through 1983, and 1987 through 1989 at concentrations up to 1.4  $\mu\text{g}/\ell$  (1982 and 1987). Aldrin was detected at 0.40  $\mu\text{g}/\ell$  in 1987, xylene was reported at 2.1  $\mu\text{g}/\ell$  in 1984, and total arsenic was detected between 1981 and 1984 at a range of 0.4 to 10  $\mu\text{g}/\ell$ .

Well OWC-2      This deep well is located at the southeast edge of the site, and is generally considered to be "upgradient" although total arsenic has frequently been detected along with occasional other contaminants. Total arsenic was again detected in December 1992 at a concentration of 41  $\mu\text{g}/\ell$ . No other contaminants (other than the common laboratory contaminant acetone) were detected by WCC in December.

The U.S. EPA split sample collected in December for analyses of VOCs at low detection levels (LDL) indicated the presence of carbon disulfide at 7.6  $\mu\text{g}/\ell$ . Carbon disulfide was not detected at limits of 5  $\mu\text{g}/\ell$  by WCC in December, although it had been detected by WCC at 15  $\mu\text{g}/\ell$  in 1990.

Well OWC-3      This shallow well is located along the southern edge of the site. In the December 1992 WCC sample, lindane was detected at 2.3  $\mu\text{g}/\ell$ , comparable to the 2.4  $\mu\text{g}/\ell$  concentration detected in the EPA split, and well above the 0.2  $\mu\text{g}/\ell$  MCL. Alpha-BHC was detected at 0.48  $\mu\text{g}/\ell$ , lower than the estimated 0.72  $\mu\text{g}/\ell$  reported for the EPA split. Silvex was detected at 3.2  $\mu\text{g}/\ell$  in the WCC sample, but was not detected in the EPA split. No other pesticides or herbicides were detected in either the WCC or EPA samples; no arsenic was detected.

The U.S. EPA split sample was collected in December 1992 for analyses for LDL VOCs. As with the deep well OWC-2, carbon disulfide (1.5  $\mu\text{g}/\ell$ ) was the only VOC detected. This was not reported at a detection limit of 5  $\mu\text{g}/\ell$  in the WCC sample.

Well OWC-4      This shallow well is located along the southern edge of the site and was added to the monitoring network in 1992 due to the presence of trichloroethene (TCE) in the adjacent deep well, OWC-20. Chevron has referred to this as an upgradient well; however, the abundance of contaminants present suggests that it has been affected by a component of groundwater flow from the highly contaminated central portion of the site.

In December 1992, TCE was detected at 47  $\mu\text{g}/\ell$ , which establishes a new minimum concentration for 1992 (down from 75  $\mu\text{g}/\ell$ ). The only other compounds detected in December 1992 were beta-BHC at 6.3  $\mu\text{g}/\ell$ , delta-BHC at 1.4  $\mu\text{g}/\ell$ , and dieldrin at 2.3  $\mu\text{g}/\ell$ . These

concentrations are comparable to the previous maximum concentrations for 1992.

In view of the pesticide and herbicide contamination detected in 1992, it is impossible to conclude that the TCE contamination was not derived from the Chevron facility.

#### Well OWC-6

This shallow well was added to the monitoring network in 1992 for three quarters in order to determine whether contaminant concentrations had decreased since this well was installed and sampled in 1981. For the December 1992 WCC sample, silvex was detected at  $1.4 \mu\text{g}/\ell$ , comparable to the 1992 maximum of  $1.5 \mu\text{g}/\ell$  and the estimated  $1.9 \mu\text{g}/\ell$  reported for the EPA sample. Lindane was detected at  $1.8 \mu\text{g}/\ell$ , with the BHC isomers detected at concentrations of  $1.5$  to  $4.6 \mu\text{g}/\ell$ . 4,4'-DDD was detected at  $2.6 \mu\text{g}/\ell$ , aldrin was detected at  $0.56 \mu\text{g}/\ell$ , and dieldrin was detected at  $1.6 \mu\text{g}/\ell$ . These concentrations are all similar to concentrations previously detected in 1992.

A U.S. EPA sample and a duplicate sample were collected in December. The data for the duplicate sample were not provided by the Region VII Laboratory in time to be incorporated in the March 29, 1993 review. In comparison to the original sample, the data for the duplicate sample for herbicides, VOCs, and arsenic are quite similar. The estimated concentrations reported for lindane, the BHC isomers, 4,4'-DDD, and the chlordane isomers for the duplicate sample are about half of what had been reported for the original sample. The concentrations for 4,4'-DDT, dieldrin, and heptachlor epoxide are similar for both the sample and the duplicate.

The only VOC detected in the WCC December 1992 sample was chlorobenzene at  $6.1 \mu\text{g}/\ell$ ; this was also detected in the EPA split sample at similar concentrations ( $5.3 \mu\text{g}/\ell$  in the sample and  $6.5 \mu\text{g}/\ell$  in the duplicate). Also detected in the December EPA split were carbon disulfide ( $1.7 \mu\text{g}/\ell$ ); 1,1-dichloroethane [1,1-DCA ( $1.2 \mu\text{g}/\ell$ )]; 1,1,1-trichloroethane [TCA ( $2.4 \mu\text{g}/\ell$ )]; and 1,2-DCA ( $2.6 \mu\text{g}/\ell$ ).

Total arsenic was detected at  $10 \mu\text{g}/\ell$ , and dissolved arsenic was detected at  $5.2 \mu\text{g}/\ell$ , comparable to the concentrations detected in the EPA split sample. The December total arsenic concentration supports the premise postulated by TES X in the March 9, 1993 review of the September 1992 WCC data that the  $0.014 \mu\text{g}/\ell$  reported was actually in  $\text{mg}/\ell$  (ppm) rather than  $\mu\text{g}/\ell$  (ppb).

#### Well OWC-8

Well OWC-8 was added to the monitoring network for three quarters in 1992 to provide information for the shallow loess zone in the highly contaminated central site area. In the December 1992 WCC sample, silvex was detected at  $51 \mu\text{g}/\ell$ , similar to the previous 1992 minimum of  $54 \mu\text{g}/\ell$  but lower than the estimated  $74 \mu\text{g}/\ell$  reported for the EPA split. All of these concentrations exceed the  $50 \mu\text{g}/\ell$  MCL for silvex.

Lindane was detected at 170  $\mu\text{g}/\ell$ , lower than the estimated 270  $\mu\text{g}/\ell$  reported for the December EPA split but within the 80 to 400  $\mu\text{g}/\ell$  range detected during 1992. Alpha-BHC and delta-BHC were detected at 76  $\mu\text{g}/\ell$  and 74  $\mu\text{g}/\ell$ , respectively; also within the existing 1992 ranges but less than the estimated concentrations reported for the EPA split sample. The lindane and BHC isomer concentrations reported for the WCC samples are approximately 60 percent of the estimated concentrations reported for the December EPA splits.

VOCs detected or reported in the December 1992 WCC sample were 1,2-DCA (12  $\mu\text{g}/\ell$ ), benzene (320  $\mu\text{g}/\ell$ ), chlorobenzene (360  $\mu\text{g}/\ell$ ), ethylbenzene (14  $\mu\text{g}/\ell$ ), MIBK (66  $\mu\text{g}/\ell$ ), and xylene (410  $\mu\text{g}/\ell$ ). These concentrations are similar to those detected previously in 1992 in either the WCC or EPA split samples. This is the only well in which the solvent MIBK has been detected. Of these VOCs, only the xylenes concentration is significantly different from what has been detected previously. The 1992 maximum for xylenes was 78  $\mu\text{g}/\ell$ , and an estimated 61  $\mu\text{g}/\ell$  had been reported for the December EPA split sample.

Analyses of BNAs in the U.S. EPA December 1992 sample indicated the presence of 1,4-dichlorobenzene (DCB - used in fumigants and insecticides) at 40  $\mu\text{g}/\ell$ , and isophorone (used in pesticides) at 98  $\mu\text{g}/\ell$ ; these are similar to the 39  $\mu\text{g}/\ell$  and 85  $\mu\text{g}/\ell$ , respectively, detected in the June 1992 EPA split sample. Also detected in the December split were 2-chlorophenol (41  $\mu\text{g}/\ell$ ) and 1,2-DCB (16  $\mu\text{g}/\ell$ ). The WCC samples were not analyzed for BNAs.

Total arsenic was detected at 110  $\mu\text{g}/\ell$  and dissolved arsenic was detected at 97  $\mu\text{g}/\ell$ , comparable to the concentrations detected in the EPA split. The December total and dissolved arsenic concentrations support the premise postulated by TES X in the March 9, 1993 review of the September 1992 WCC data that the 0.086  $\mu\text{g}/\ell$  and 0.11  $\mu\text{g}/\ell$  reported were actually in  $\text{mg}/\ell$  (ppm) rather than the  $\mu\text{g}/\ell$  (ppb).

#### Well OWC-9

This shallow well, located at the northeastern corner of the site, was added to the monitoring network in March 1992 at the suggestion of the U.S. EPA to eliminate a data gap for that portion of the site. Lindane was not detected in 1992; however, beta-BHC was detected in three out of four samples collected during 1992 (not detected in June). The December concentration of 0.053  $\mu\text{g}/\ell$  is similar to the 0.059  $\mu\text{g}/\ell$  March concentration. Historically, lindane was detected at 0.45  $\mu\text{g}/\ell$  and 0.82  $\mu\text{g}/\ell$  in 1981.

In December 1992, dieldrin was detected at 0.15  $\mu\text{g}/\ell$ , 4,4'-DDD was detected at 0.22  $\mu\text{g}/\ell$ , 4,4'-DDT was detected at 0.13  $\mu\text{g}/\ell$ , and 4,4'-DDE was detected at 0.16  $\mu\text{g}/\ell$ . These low concentrations are similar to the values previously detected in 1992.



Total arsenic had been detected at 6.6  $\mu\text{g}/\ell$  in March, but has not been detected in June, September, or December 1992; dissolved arsenic was not detected during any of the four sampling events.

#### Well OWC-12A

This deep well is located in the central portion of the site and has consistently been one of the most contaminated wells. The December 1992 WCC sample concentrations are generally quite similar to the concentrations previously detected in 1992.

In December 1992, silvex was detected at 3.4  $\mu\text{g}/\ell$  in the sample, which is similar to concentrations previously detected in 1992, although less than the estimated 4.7  $\mu\text{g}/\ell$  reported for the December EPA split sample. Silvex was not detected in the WCC duplicate sample for December. 2,4-D was not detected in the December WCC or EPA samples; it was detected in both of the June samples.

Lindane was detected at 290  $\mu\text{g}/\ell$ , which is within the existing 1992 range of 260 to 310  $\mu\text{g}/\ell$ , and is vastly above the 0.2  $\mu\text{g}/\ell$  MCL. Alpha-BHC was detected at 220  $\mu\text{g}/\ell$ , beta-BHC was detected at 34  $\mu\text{g}/\ell$ , and delta-BHC was detected at 290  $\mu\text{g}/\ell$ . These are all similar to concentrations previously detected in 1992. The WCC sample and duplicate results are similar to each other, though they are all higher than the concentrations estimated for the December EPA sample split.

In the December 1992 WCC sample, the VOCs benzene (250  $\mu\text{g}/\ell$ ), chlorobenzene (910  $\mu\text{g}/\ell$ ), ethylbenzene (140  $\mu\text{g}/\ell$ ), and xylene (730  $\mu\text{g}/\ell$ ) were detected. These compounds were all reported in the December EPA split samples, although at generally lower estimated concentrations. In the December 1992 EPA split sample, the VOCs vinyl chloride (estimated at 23  $\mu\text{g}/\ell$ ), chloroform (estimated at 21  $\mu\text{g}/\ell$ ), 1,2-DCA (estimated at 36  $\mu\text{g}/\ell$ ), and 1,1,2-trichloroethane (1,1,2-TCA estimated at 79  $\mu\text{g}/\ell$ ) were also detected. The vinyl chloride, 1,2-DCA, benzene, and chlorobenzene concentrations are above the MCLs for these compounds; the 1,1,2-TCA concentration is above the proposed MCL of 5  $\mu\text{g}/\ell$ . Methyl ethyl ketone (MEK or 2-butanone), a common laboratory contaminant, was reported in the EPA December sample at an estimated 10  $\mu\text{g}/\ell$ .

The December and June 1992 U.S. EPA split samples were analyzed for BNAs. 1,4-DCB (110  $\mu\text{g}/\ell$ ), 1,2,4-trichlorobenzene (estimated at 33  $\mu\text{g}/\ell$ ), naphthalene (410  $\mu\text{g}/\ell$ ), and 2-methylnaphthalene (120  $\mu\text{g}/\ell$ ) were reported in both June and December. The December sample also indicated the presence of the fumigant/termite insecticide 1,2-DCB. The 1,4-DCB concentration exceeds the 75  $\mu\text{g}/\ell$  MCL for this compound.

Neither total nor dissolved arsenic were detected in the December 1992 WCC sample; however, dissolved arsenic was detected at 1.4  $\mu\text{g}/\ell$  in the EPA split sample.

Well OWC-14

The December 1992 WCC data indicate that silvex, the BHC isomers, lindane, chlorobenzene, and arsenic were detected in this downgradient shallow well at concentrations similar to those detected in September. Silvex was detected at 0.65  $\mu\text{g}/\ell$ , the BHC isomers were detected between 0.39 and 2  $\mu\text{g}/\ell$ , lindane was detected at 0.48  $\mu\text{g}/\ell$ , chlorobenzene was detected at 7.8  $\mu\text{g}/\ell$ , and arsenic was detected at 7.5  $\mu\text{g}/\ell$ . Dieldrin was also detected in December at a concentration of 0.53  $\mu\text{g}/\ell$ . Although not previously detected in 1992, this is comparable to the dieldrin maximum concentration (0.54  $\mu\text{g}/\ell$ ) detected in 1991.

The December total arsenic concentration supports the premise postulated by TES X in the March 9, 1993 review of the September 1992 WCC data that the 0.0052  $\mu\text{g}/\ell$  concentration reported was actually  $\text{mg}/\ell$  (ppm) rather than  $\mu\text{g}/\ell$  (ppb).

Well OWC-15

The December 1992 results indicate that lindane was detected at 0.31  $\mu\text{g}/\ell$ , which is somewhat above the MCL. Alpha-BHC, beta-BHC, and dieldrin were detected at 0.2  $\mu\text{g}/\ell$ , 0.12  $\mu\text{g}/\ell$ , and 0.2  $\mu\text{g}/\ell$ , respectively. These concentrations are similar to those detected previously in 1992. No herbicides or arsenic were detected in June, September, or December 1992. The VOC carbon disulfide was detected in December at a concentration of 12  $\mu\text{g}/\ell$ ; no other VOCs except the common laboratory contaminant acetone were detected.

Well OWC-16

Silvex was detected at 1.6  $\mu\text{g}/\ell$  in December, lower than the previous 1992 minimum of 1.9  $\mu\text{g}/\ell$ . Lindane has not been detected since 1989, although the BHC isomers have consistently been detected. In December 1992, the BHC isomers were detected at concentrations between 0.73 and 4.0  $\mu\text{g}/\ell$  in this shallow well. No VOCs or arsenic were detected in December, September, or June 1992.

Well OWC-17

This shallow well is located in the central portion of the site, downgradient of the fire debris disposal area. Silvex was detected at 9.1  $\mu\text{g}/\ell$ , lower than the previous 1992 minimum of 15  $\mu\text{g}/\ell$ , as well as being lower than the estimated 17  $\mu\text{g}/\ell$  reported for the December EPA split sample. With the exception of delta-BHC, the lindane and BHC isomer concentrations are similar to the existing 1992 maximums for these compounds. Lindane was detected at 24  $\mu\text{g}/\ell$ , alpha-BHC was detected at 52  $\mu\text{g}/\ell$ , and beta-BHC was detected at 21  $\mu\text{g}/\ell$ . Delta-BHC was detected at 120  $\mu\text{g}/\ell$ , well above the previous maximum of 88  $\mu\text{g}/\ell$ . Aldrin was also reported at an estimated concentration of 4.8  $\mu\text{g}/\ell$ . These concentrations are all well above the estimated concentrations reported for the December EPA sample split. In the EPA sample, 4,4-DDE (estimated at 0.13  $\mu\text{g}/\ell$ ) was also reported.

The December WCC volatile organics analyses indicate the presence of 540  $\mu\text{g}/\ell$  of chlorobenzene, lower than the previous 1992 minimum of 580  $\mu\text{g}/\ell$ , but comparable to the 550  $\mu\text{g}/\ell$  detected in the December EPA sample split. Also detected in the EPA split,

but not previously reported in this well, were 1,2-DCA (estimated at 11  $\mu\text{g}/\ell$ ) and benzene (estimated at 12  $\mu\text{g}/\ell$ ).

In December 1992, a sample was collected for analyses of BNAs by the U.S. EPA. As with nearby deep well OWC-12A, the fumigant/insecticides 1,4-DCB and 1,2-DCB were identified. 1,4-DCB was detected at 75  $\mu\text{g}/\ell$ , which is the MCL. 1,2-DCB was detected at 28  $\mu\text{g}/\ell$ , well below the 600  $\mu\text{g}/\ell$  MCL. Also detected were 38  $\mu\text{g}/\ell$  of 4-chloro-3-methyl phenol, and 12  $\mu\text{g}/\ell$  of bis(2-ethylhexyl) phthalate. Phthalates are common plasticizers, and could be due to laboratory contamination.

Total arsenic was detected in December 1992 WCC sample at 16  $\mu\text{g}/\ell$  and dissolved arsenic was detected at 11  $\mu\text{g}/\ell$ . These concentrations are comparable to those detected in the EPA sample split. Dissolved arsenic was reported at 0.11  $\mu\text{g}/\ell$  by WCC for the September 1992 sample, which is lower than the usual detection limits of 10  $\mu\text{g}/\ell$  for arsenic, and appeared to be a reporting error. WCC should verify the questionable arsenic data from September 1992.

#### Well OWC-18

This downgradient well is screened in the deep, unweathered limestone bedrock. Lindane was detected in December 1992 at 1.3  $\mu\text{g}/\ell$ , which is a decrease from the previous 2.0  $\mu\text{g}/\ell$  1992 minimum. Alpha-BHC was detected at 7.7  $\mu\text{g}/\ell$  and delta-BHC was detected at 2.5  $\mu\text{g}/\ell$  in December 1992. These concentrations are similar to those detected since 1990. Beta-BHC was not detected in the June, September, or December WCC samples, but was detected at 0.28  $\mu\text{g}/\ell$  in the June 1992 U.S. EPA split sample.

Silvex was detected 0.8  $\mu\text{g}/\ell$ , similar to the concentrations previously detected in 1992. 2,4-D was not detected at limits of 1.2  $\mu\text{g}/\ell$ ; it had previously been detected at 3.1 and 4.8  $\mu\text{g}/\ell$  in 1992.

The December 1992 concentrations for 1,2-DCA, 1,1,2-TCA, and chlorobenzene are similar to the concentrations previously detected in 1992. Chlorobenzene was detected at 120  $\mu\text{g}/\ell$ , 1,2-DCA was detected at 12  $\mu\text{g}/\ell$ , and 1,1,2-TCA was detected at 13  $\mu\text{g}/\ell$ . At the lower detection rates obtained for the June 1992 U.S. EPA split sample, vinyl chloride was reported at an estimated (coded "J") 11  $\mu\text{g}/\ell$ , TCE was detected at 3  $\mu\text{g}/\ell$ , benzene was detected at 4  $\mu\text{g}/\ell$ , and xylene was detected at 2  $\mu\text{g}/\ell$ . These compounds were not detected by WCC.

Historically, the June 1991 WCC sample results indicate the presence of 1,2-dichloroethene (1,2-DCE) at a concentration of 15  $\mu\text{g}/\ell$ . As mentioned in the original review of these data, this is quite similar to the concentrations typically detected for 1,2-DCA, and suggests that the identification of this compound as 1,2-DCE could simply be a typographical error.

Total arsenic was detected at 6.0  $\mu\text{g}/\ell$  in December 1992, similar to the 9.8  $\mu\text{g}/\ell$  detected in June. Dissolved arsenic was not detected in June, September, or December 1992.

#### Well OWC-19

Well OWC-19, which was not sampled in September 1992 (well OWC-13 was sampled instead), was again sampled in December. A U.S. EPA split sample was also collected. Silvex was detected at 0.19  $\mu\text{g}/\ell$  in the December WCC sample, much lower than the estimated 45  $\mu\text{g}/\ell$  reported for the EPA split sample for December or the 28  $\mu\text{g}/\ell$  detected in both the WCC and EPA split samples in June 1992.

Lindane was detected in the December 1992 WCC split sample at 180  $\mu\text{g}/\ell$ , compared to the EPA sample concentration of 230  $\mu\text{g}/\ell$ . Alpha-BHC (detected at 110  $\mu\text{g}/\ell$ ) and beta-BHC (estimated at 6.7  $\mu\text{g}/\ell$ ) were also lower than the estimated or detected concentration of 150  $\mu\text{g}/\ell$  and 13  $\mu\text{g}/\ell$ , respectively, reported for the EPA December sample split.

In the December 1992 WCC sample, chlorobenzene was detected at 200  $\mu\text{g}/\ell$ , which is comparable to the 220  $\mu\text{g}/\ell$  detected in the EPA split sample. Other VOCs detected were 1,2-DCA (7  $\mu\text{g}/\ell$ ), TCE (7.8  $\mu\text{g}/\ell$ ), and 1,1,2-TCA (7.6  $\mu\text{g}/\ell$ ); these concentrations are comparable to those previously detected. In the June EPA split sample, vinyl chloride (estimated at 4  $\mu\text{g}/\ell$ ), 1,1-DCA (1  $\mu\text{g}/\ell$ ), chloroform (1  $\mu\text{g}/\ell$ ), and benzene (6  $\mu\text{g}/\ell$ ) were also reported. Semi-volatiles were not analyzed in December; however, in the June 1992 U.S. EPA split sample 1,4-DCB was detected at 22  $\mu\text{g}/\ell$ .

In the December 1992 WCC sample, total arsenic was detected at 12,000  $\mu\text{g}/\ell$  and dissolved arsenic was detected at 12,500  $\mu\text{g}/\ell$ . These concentrations are similar to those previously detected for this well and greatly exceed the MCL of 50  $\mu\text{g}/\ell$  for total arsenic.

#### Well OWC-20

In December 1992, lindane was detected at 0.24  $\mu\text{g}/\ell$ , and alpha-BHC was detected at 0.088  $\mu\text{g}/\ell$  in this deep well located down and cross-gradient from the central site area of highest contamination. These concentrations are somewhat lower than the previous 1992 minimums of 0.41  $\mu\text{g}/\ell$  and 0.21  $\mu\text{g}/\ell$ , respectively. Delta-BHC was not detected in 1992, but was detected at a maximum of 0.29  $\mu\text{g}/\ell$  in 1991.

Trichloroethene was detected at 1,300  $\mu\text{g}/\ell$  in December, down from the 1,500  $\mu\text{g}/\ell$  detected in September and the 4,200  $\mu\text{g}/\ell$  detected in June 1992. In 1991, TCE was detected at a range of 1,500 to 2,100  $\mu\text{g}/\ell$ . These TCE concentrations vastly exceed the 5  $\mu\text{g}/\ell$  MCL. No other VOCs were detected in the WCC samples in June, September, or December 1992.

The U.S. EPA VOC split collected in June 1992 was analyzed at LDL in order to determine what other VOCs might be present at concentrations below the detection limits necessary to quantify the large TCE concentration. In the June EPA split sample, 1,1-

dichloroethene (estimated at 3  $\mu\text{g}/\ell$ ), 1,2-DCE (1  $\mu\text{g}/\ell$ ), chloroform (1  $\mu\text{g}/\ell$ ), 1,1,2-TCA (3  $\mu\text{g}/\ell$ ), tetrachloroethene (1  $\mu\text{g}/\ell$ ), benzene (1  $\mu\text{g}/\ell$ ), and chlorobenzene (2  $\mu\text{g}/\ell$ ) were also detected.

Total and dissolved arsenic were not detected in June, September, or December 1992.

Well OWC-23

This well was added to the monitoring well network in 1992, as it is screened in the clay underlying the contaminated silty loess and could provide information on migration through the clay layer. In December 1992, lindane was detected at 0.27  $\mu\text{g}/\ell$ , alpha-BHC was detected at 0.25  $\mu\text{g}/\ell$ , beta-BHC was detected at 1.3  $\mu\text{g}/\ell$ , and delta-BHC was detected at 0.32  $\mu\text{g}/\ell$ . Silvex was detected 0.95  $\mu\text{g}/\ell$ , and dieldrin was detected at 2.3  $\mu\text{g}/\ell$ . 4,4-DDD (0.72  $\mu\text{g}/\ell$ ), 4,4-DDE (0.46  $\mu\text{g}/\ell$ ), 4,4-DDT (0.89  $\mu\text{g}/\ell$ ), and aldrin (0.73  $\mu\text{g}/\ell$ ) were also detected. Except for aldrin, these concentrations are all somewhat lower than the previous 1992 minimums; the aldrin concentration is within the 1992 range of 0.38 to 1.3  $\mu\text{g}/\ell$ .

Total arsenic was detected at 69  $\mu\text{g}/\ell$  in December, up from the previous 1992 maximum of 50  $\mu\text{g}/\ell$ ; dissolved arsenic was not detected. No VOCs (other than the common laboratory contaminant acetone) were detected.

Well OWC-24

Alpha-BHC was detected at 0.07  $\mu\text{g}/\ell$  and beta-BHC was detected at 0.064  $\mu\text{g}/\ell$  in December 1992. These concentrations are within the ranges previously detected in 1992 for these compounds. No other pesticides were detected in this shallow, downgradient well in 1992. No VOCs or arsenic were detected in 1992.

Well OWC-25

No contaminants were detected in this deep well located off site and far downgradient in 1990, 1991, or 1992. Historically, 0.53  $\mu\text{g}/\ell$  of lindane was detected in this well in 1987, and 0.15  $\mu\text{g}/\ell$  was detected in 1989. In 1989, 9  $\mu\text{g}/\ell$  of total arsenic was detected.

Well OWC-26

No contaminants were detected in this shallow, downgradient well located off site in 1990, 1991, or 1992. In 1989, total arsenic was detected at 10  $\mu\text{g}/\ell$ , and dissolved arsenic was detected at 16  $\mu\text{g}/\ell$  in a duplicate sample. The original sample analyses did not detect arsenic.

Well OWC-27

No contaminants other than total arsenic were detected in the December 1992 WCC sample. The total arsenic concentration was 55  $\mu\text{g}/\ell$ , and exceeds the 50  $\mu\text{g}/\ell$  MCL for the first time since this well was installed.

The December 1992 EPA split sample was collected for LDL VOCs due to the occasional detection of TCE in the WCC samples from this well. Previous EPA split samples had not been collected from this well. In the December 1992 EPA split samples, TCE was detected at 5.9  $\mu\text{g}/\ell$ , compared to the 11  $\mu\text{g}/\ell$  detected by WCC in

September 1992 and the 1992 maximum of 19  $\mu\text{g}/\ell$  detected in June. These TCE concentrations are all above the 5  $\mu\text{g}/\ell$  MCL. 1,2-DCE was detected in the EPA split at 2.1  $\mu\text{g}/\ell$ ; this compound had previously been detected from a single sample in 1991 at 9.8  $\mu\text{g}/\ell$ . TCE was not found at a detection limit of 5  $\mu\text{g}/\ell$  in the December WCC sample.

Well OWC-28

This deep downgradient well is located off site and is screened in the limestone bedrock. In December 1992, lindane was detected at 4  $\mu\text{g}/\ell$  in the sample and 4.2  $\mu\text{g}/\ell$  in the duplicate. These concentrations are similar to those detected since this well was installed in 1989. Alpha-BHC was detected at 2.1  $\mu\text{g}/\ell$  and delta-BHC was detected at 0.47  $\mu\text{g}/\ell$  in December 1992. No other pesticides were detected in the 1992 WCC samples; however, 4,4'-DDD (0.032  $\mu\text{g}/\ell$ ), 4,4'-DDT (0.04  $\mu\text{g}/\ell$ ), and dieldrin (0.05  $\mu\text{g}/\ell$ ) were detected at the lower detection rates for the June 1992 U.S. EPA split sample.

No VOCs were detected in the December WCC sample; in September 1992, carbon disulfide had been detected at 6.8  $\mu\text{g}/\ell$ . At the lower detection limits for the U.S. EPA split sample from June, chloroform (1  $\mu\text{g}/\ell$ ), toluene (2  $\mu\text{g}/\ell$ ) chlorobenzene (3  $\mu\text{g}/\ell$ ), and xylene (4  $\mu\text{g}/\ell$ ) were detected. No BNAs were detected in the sample collected by the U.S. EPA in June 1992.

Total and dissolved arsenic were not detected in 1991 or 1992.

Well OWC-29

This downgradient offsite well, screened in the deep limestone, was drilled and sampled in August 1992 at which time a U.S. EPA split sample was collected. WCC collected samples in September 1992, and both WCC and the U.S. EPA collected samples in December.

In the December WCC sample, lindane was detected at 0.67  $\mu\text{g}/\ell$ , comparable to the 0.68  $\mu\text{g}/\ell$  detected in the December U.S. EPA split sample and above the 0.2  $\mu\text{g}/\ell$  MCL. Alpha-BHC was detected at 0.25  $\mu\text{g}/\ell$ , comparable to the concentrations previously detected, although lower than the 0.38  $\mu\text{g}/\ell$  estimated for the December EPA split sample. No other pesticides have been detected in this well.

TCE was detected in the December WCC sample at 5.2  $\mu\text{g}/\ell$ , identical to that detected in the EPA split sample. The TCE concentration exceeds the 5  $\mu\text{g}/\ell$  MCL. 1,2-DCE was detected in the December 1992 WCC sample at 31  $\mu\text{g}/\ell$ , comparable to the 26  $\mu\text{g}/\ell$  detected in the EPA split sample. No other VOCs were detected in the December WCC sample; however, tetrachloroethene was detected at 2.5  $\mu\text{g}/\ell$  in the EPA sample. This concentration was comparable to the 3  $\mu\text{g}/\ell$  detected in the August U.S. EPA split sample. Semi-volatiles were not sampled in December as no BNAs had been detected in the August EPA split sample. Arsenic has not been detected in any of the 1992 samples.

#### 4.0 CONCLUSIONS

The pesticide, herbicide, and arsenic concentrations reported or detected in the groundwater samples from the wells sampled during this period are generally similar to those detected in previous years. The volatile organics concentrations in various wells, particularly those concentrations in excess of the MCLs for the VOCs, should be addressed by Chevron. The source and extent of the VOC contamination (particularly the TCE) should be determined in future work at this site. It should be noted that TCE (also chlorobenzene) is denser than water and has a tendency to sink to the bottom of the water column. Therefore, it is possible that the TCE contamination exists in the groundwater below the intervals presently being monitored.

The lack of detectable TCE in OWC-3 as compared with the 120  $\mu\text{g}/\ell$  detected (June 1992 EPA split) in shallow well OWC-4, located approximately 500 ft to the west, is of interest. This well is located to the southeast of shallow well OWC-19, which has been found to contain low levels of TCE (11  $\mu\text{g}/\ell$  or less). The groundwater gradient at the site is generally west to northwest; thus, OWC-19 should generally be downgradient from OWC-3. If the TCE detected in OWC-19 had migrated onto the site with the northwestward groundwater gradient, it is unusual that the TCE is not present in OWC-3. If the TCE were transported to OWC-19 from the area of OWC-4, then it is flowing across the groundwater gradient, possibly along bedding or some other impermeable barrier. TCE is denser than water and, along with the other chlorinated solvents, could form a Dense Nonaqueous Phase Liquid (DNAPL) that would not necessarily flow with the gradient. The VOCs that are lighter than water such as benzene, ethylbenzene, and xylenes, would be expected to flow with the gradient. Chevron should perform further studies to delineate these contaminant plumes. Chevron should also provide detailed information (MSDS sheets or formulation data) on the products used on site.

## APPENDIX A

### Historical Groundwater Data from the Ortho-Chevron Facility



## Explanations for Historical Groundwater Tables.

Minimum/Maximum concentrations are shown when there is more than one sampling event per year. For compounds not detected, only the minimum detection limits are given.

Individual sampling events (e.g., Jun-92) represent U.S. EPA split samples.

MCL = Maximum Contaminant Level; [Proposed MCL].

\* MCL of 170 ug/L for total 1,2-Dichloroethene (70 ug/L for Cis- and 100 ug/L for Trans-).

Shading indicates that at least one concentration detected during the year shown meets or exceeds the present MCL for that compound.

Blank spaces indicate no information as to whether a sample was not collected or not analyzed, or no data has been located by TES X.

{Duplicate Sample Result} Not shown where compounds were not detected at the same detection limits.

I = Data invalidated by laboratory.

J = Concentration reported but not valid by approved QC procedures (estimated concentration).

K = Compound not detected at CLP required detection limits for U.S. EPA data. (same as "U" for U.S. EPA data prior to December 1992).

NA = Not Analyzed for compound (e.g., Endrin).

NS = Not Sampled for analysis (e.g., Herbicides).

U = Not detected at detection limit provided.

WCC data tables, beginning with selected wells in December 1990, report that all TCL volatile compounds analyzed but were omitted from their data tables if the results were not detected. Thus, TCL volatile compounds for WCC are frequently shown as "U" with no detection limit indicated as none was provided. TCL VOCs for September and December 1992 assumed to be not detected if not listed on WCC tables.

Other parameters may be shown as "U" when all parameters were not detected at various detection limits (e.g., Semi-volatiles).

Metals data provided on the historical tables are only for total and dissolved arsenic concentrations. Metals detected in U.S. EPA split samples are listed the summary tables at the end of this appendix.



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Date 4/13/93 Our Job No. 270002.0002.003

TO

U.S. EPA, REGION VII  
726 MINNESOTA AVE  
KANSAS CITY, KS  
66101

Attention MS. CATHERINE BARRETT  
Re: Review of WCC 12/92  
Quarterly GW Monitoring  
Report for Orto-Chevron,  
Maryland Heights, Mo

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MICHAEL M. KATZMAN

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-1 (Page 1)

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC 1983	WCC 1984	WCC 1985	WCC 1986	WCC 1987
<b>Herbicides</b>								
2,4,5-T		.1U/0.4	5U	1U	1U	1U		1U
2,4-D	70	1U/1.8	5U	.1U	1U	1U		1U
2,4,5-TP (Silvex)	50	0.4	1U	.1U	NA	NA		
<b>Pesticides</b>								
alpha-BHC								
beta-BHC								
delta-BHC								
gamma-BHC (Lindane)	0.2	0.15/0.26	1U/1.4	.1U	.1U	.1U	.1U	.1U/1.4
4,4'-DDD		.2U	NA	1U	.1U	.1U		.1U
4,4'-DDE		.2U	NA	1U	.1U	.1U		.1U
4,4'-DDT		.3U	NA	1U	.1U	.1U		.1U
Aldrin		0.12/.2U	.1U	.1U	.1U	.1U		.1U/.40
Dieldrin		.2U	.1U	.1U	.1U	.1U		.1U
Diazinon		.5U	NA	NA	NA	NA		
Endrin	0.2	.4U	NA	.1U	.1U	.1U		
Chlordane	2	1U	NA	5U	5U	.1U		
Heptachlor	0.4	.1U	NA	.1U	.1U	.1U		
Methoxychlor	40	.8U	NA	5U	5U	5U		
Toxaphene	3	10U	NA	5U	5U	5U		
Malathion		1U	NA	NA	NA	NA		
E. Parathion		.5U	NA	NA	NA	NA		
M. Parathion		1U	NA	NA	NA	NA		
<b>Volatile Organics</b>								
Acetone								
Carbon Disulfide								
1,2-Dichloroethene	170*							
1,1,1-Trichloroethane	200							
1,1,2-Trichloroethane	[5]							
1,2-Dichloroethane	5							
2-Butanone (MEK)								
Trichloroethene	5							
Benzene	5							
Chlorobenzene	100							
Ethylbenzene	700							
4-Methyl-2-Pentanone								
Xylene (Xylol)	10000	NA	10U	1U	1U/2.1	1U		1U
<b>Metals</b>								
Total Arsenic	50	1U/10	0.4/1.1	0.5/0.85	.2U/2.4	1U		
Dissolved Arsenic		NA	NA	NA	NA	NA		10U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-1 (Page 2)

Analyte (ug/L)	MCL	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992
<b>Herbicides</b>						
2,4,5-T		1U		.2U	.2U	.2U
2,4-D	70	1U		1.2U	1.2U	1.2U
2,4,5-TP (Silvex)	50			.17U	.17U	.17U
<b>Pesticides</b>						
alpha-BHC				.05U	.05U	.05U
beta-BHC				.05U	.05U	.05U
delta-BHC				.05U	.05U	.05U
gamma-BHC (Lindane)	0.2	.1U/.16	0.053	.05U	.05U	.05U
4,4'-DDD		.1U		.1U	.1U	.1U
4,4'-DDE		.1U		.1U	.1U	.1U
4,4'-DDT		.1U		.1U	.1U	.1U
Aldrin		.1U		.5U	.05U	.05U
Dieldrin		.1U		.1U	.1U	.1U
Diazinon						
Endrin	0.2					NA
Chlordane	2					NA
Heptachlor	0.4					NA
Methoxychlor	40	.5U				NA
Toxaphene	3	5U				NA
Malathion						
E. Parathion						
M. Parathion						
<b>Volatile Organics</b>						
Acetone					10U	10U/14
Carbon Disulfide					U	5U
1,2-Dichloroethene	170*				U	5U
1,1,1-Trichloroethane	200				U	5U
1,1,2-Trichloroethane	[5]				5U	5U
1,2-Dichloroethane	5				U	5U
2-Butanone (MEK)					U	5U
Trichloroethene	5				5U	5U
Benzene	5				U	5U
Chlorobenzene	100				5U	5U
Ethylbenzene	700				U	5U
4-Methyl-2-Pentanone					U	10U
Xylene (Xylol)	10000	1U/5U		5U	5U	5U
<b>Metals</b>						
Total Arsenic	50			5U	5U	5U
Dissolved Arsenic		10U		5U	5U	5U

Historical Groundwater Data from the Ortho-Chevron Facility

Well: OWC-2

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC 1983	WCC No Data 1984-1989	WCC 1990	WCC 1991	WCC 1992	EPA Dec-92
<b>Herbicides</b>									
2,4,5-T		NA	5U	.1U/2.49		.2U	.32U	.2U	NS
2,4-D	70	1U	5U	.1U/6.6		1.2U	1.9U	1.2U	NS
2,4,5-TP (Silvex)	50	.1U	1U	NA		.17U	.27U	.17U	NS
<b>Pesticides</b>									
alpha-BHC						.05U	0.059	.05U	NS
beta-BHC						.05U	.05U	.05U	NS
delta-BHC						.05U	.05U	.05U	NS
gamma-BHC (Lindane)	0.2	0.23	0.82/4.6	.1U/6.4		.05U	.05U	.05U	NS
4,4'-DDD		.2U	NA	NA		.1U	.1U	.1U	NS
4,4'-DDE		.2U	NA	NA		.1U	.1U	.1U	NS
4,4'-DDT		.3U	NA	NA		.1U	.1U	.1U	NS
Aldrin		.2U	.1U	.1U/0.32		.05U	.05U	.05U	NS
Dieldrin		.2U	0.24/0.40	.1U		.1U	.1U	.1U	NS
Diazinon		.5U	NA	NA					NS
Endrin	2	.4U	NA	NA		.1U	NA	NA	NS
Chlordane	2	1U	NA	NA		.05U	NA	NA	NS
Heptachlor	0.4	.2U	NA	NA		.05U	NA	NA	NS
Methoxychlor	40	.8U	NA	NA		.5U	NA	NA	NS
Toxaphene	3	10U	NA	NA		5U	NA	NA	NS
Malathion		1U	NA	NA					NS
Ethyl Parathion		.5U	NA	NA					NS
Methyl Parathion		1U	NA	NA					NS
<b>Volatile Organics</b>									
Vinyl Chloride	2					U	10U	U	1K
Acetone						U	10U	U/12	14J
Carbon Disulfide						15	U	5U	7.6
1,1-Dichloroethene	7					U	U	U	1K
1,2-Dichloroethene	170*					U	5U	5U	1K
Chloroform						U	U	U	1K
1,2-Dichloroethane	5					5U	5U	5U	1K
Trichloroethene	5					U	5U	5U	1K
1,1,2-Trichloroethane	[5]					5U	5U	5U	1K
Benzene	5					5U	U	5U	1K
Tetrachloroethene	5					U	U	U	1K
Toluene	1000					U	U	U	1K
Chlorobenzene	100					5U	5U	5U	1K
Ethylbenzene	700					5U	U	5U	1K
Xylene (Xylol)	10000	NA	500U	1U		5U	5U	5U	1K
<b>Metals</b>									
Total Arsenic	50	1	.1U/0.4	0.63/1.2		320	59	13/41	NS
Dissolved Arsenic		NA	NA	NA		5U	NA	5U	NS

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-3

Analyte (ug/L)	MCL	WCC 1981	WCC No data for 1982-1991			WCC 1992	EPA Dec-92
Herbicides							
2,4,5-T		0.1/NA				.2U	.2U
2,4-D	70	1U				1.2U	2.1
2,4,5-TP (Silvex)	50	NA/.1U				.17U/3.2	.2U
Pesticides							
alpha-BHC						0.24/0.68	0.72J
beta-BHC						.02U	.05K
delta-BHC						.02U	.05K
gamma-BHC (Lindane)	0.2	0.3/1.07				0.66/3.0	2.4
4,4'-DDD		.2U				.1U	.1K
4,4'-DDE		.2U				.1U	.1K
4,4'-DDT		.3U				.1U	.1K
Aldrin		.12U/.2U				.05U	.05K
Dieldrin		.2U				.1U	.1K
Diazinon		.5U/1.7					NA
Endrin	2	.4U				.1U	.1K
Chlordane	2	1U				.5U	.5K
Heptachlor	0.4	.1U/.2U				.05U	.05K
Methoxychlor	40	.8U				.5U	.5K
Toxaphene	3	10U				5U	5K
Malathion		1U/2U					NA
E. Parathion		.5U					NA
M. Parathion		1U/2U					NA
Volatile Organics							
Acetone						10U	I
Carbon Disulfide						5U	1.5
1,2-Dichloroethene	170*					5U	1K
1,1,1-Trichloroethane	200					5U	1K
1,1,2-Trichloroethane	[5]					5U	1K
1,2-Dichloroethane	5					5U	1K
2-Butanone (MEK)						11	I
Trichloroethene	5					5U	1K
Benzene	5					5U	1K
Chlorobenzene	100					5U	1K
Ethylbenzene	700					5U	1K
4-Methyl-2-Pentanone						10U	5K
Xylene (Xylol)	10000					5U	1K
Metals							
Total Arsenic	50	1U/24				5U	1.1U
Dissolved Arsenic						5U	1.1U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-4

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC No data for 1983-1991			WCC 1992	EPA Jun-92
Herbicides								
2,4,5-T		.1U/1.9	NA				.2U	.2U
2,4-D	70	1U/47	5U				1.2U/1.2	1.3
2,4,5-TP (Silvex)	50	.1U	1U				.17U	.15U
Pesticides								
alpha-BHC							.25U/1.1	.14U
beta-BHC							3.3/8.1	7.2
delta-BHC							1.0/1.4	0.87
gamma-BHC (Lindane)	0.2	1U/1.25	1.19				0.3/ .5U	.52U
4,4'-DDD		.2U	NA				.5U	.06U
4,4'-DDE		.2U	NA				.5U	.11U
4,4'-DDT		.3U	NA				.5U	.01U
Aldrin		.12U	.1U				.25U	.004U
Dieldrin		.2U	0.41				1.9/2.3	1.7
Diazinon		.5U/1.6	NA					
Endrin	2	.4U	NA				.5U	.15U
Endrin Ketone								1.6
Chlordane	2	1U	NA				2.5U	.02U
Heptachlor	0.4	2U/1.76	NA				.25U	.009U
Heptachlor Epoxide								0.21
Methoxychlor	40	.8U	NA				2.5U	0.19
Toxaphene	3	10U	NA				25U	.5U
Malathion		1U	NA					
E. Parathion		.5U	NA					
M. Parathion		1U	NA					
PCBs		10U**	NA					U***
Volatile Organics								
Acetone							10U	2U
Carbon Disulfide							5U	1U
1,2-Dichloroethene	170*						5U	1U
1,1,1-Trichloroethane	200						5U	1U
1,1,2-Trichloroethane	[5]						5U	1U
1,2-Dichloroethane	5						5U	1U
2-Butanone (MEK)							10U	2U
Trichloroethene	5						47/110	120
Benzene	5						5U	1U
Chlorobenzene	100						5U	1U
Ethylbenzene	700						5U	1U
Xylene	10000	NA	10U				5U	1U
Metals								
Total Arsenic	50	1U	NA				5U	50U
Dissolved Arsenic							5U	50U

Note:

\*\* Individual Aroclors (PCB-1242, -1254, -1221, -1232, -1248, -1260) were analyzed.

\*\*\* PCB detection limits varied from 0.05 to 0.40 ug/L.

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-6

Analyte (ug/L)	MCL	WCC Feb. 1981	WCC Aug. 1981	WCC No data for 1982-1991			WCC 1992	EPA Dec-92
Herbicides								
2,4,5-T		.1U	NA				.2U	.2U
2,4-D	70	1.1	1U				1.2U	.1U
2,4,5-TP (Silvex)	50	NA	.1U				0.75/1.5	1.9J,{1.9J}
Pesticides								
alpha-BHC							1.2/2.1	2.1J, {1.1J}
beta-BHC							2.7/6	6.1,{3.6}
delta-BHC							1.1/1.7	1.7J,{0.78J}
gamma-BHC (Lindane)	0.2	43.2	5.78				1/1.8	1.2J,{0.61J}
4,4'-DDD		2.53	0.99				2/2.6	3.5J,{1.7J}
4,4'-DDE		.2U	.2U				.5U	.1K
4,4'-DDT		0.96	.3U				.5U	0.17J,{0.12J}
Aldrin		6.94	.2U				0.26/0.56	.05K
Dieldrin		3.89	1.46				1.1/1.6	1.6,{1.2J}
Diazinon		27.3	5.8					NA
Endrin	2	.4U	.4U				.5U	.1K
Endrin Ketone								0.52
Chlordane (Technical)	2	1U	1U				2.5U	NA
Alpha Chlordane							NA	1.1J, {0.73}
Gamma Chlordane							NA	1.4, {0.82}
Heptachlor	0.4	4.62	.2U				.25U	.05K
Heptachlor Epoxide								0.27,{0.32}
Methoxychlor	40	.8U	.8U				2.5U	.5K
Toxaphene	3	10U	10U				25U	5K
Malathion		2U	4.1					NA
Parathion, Ethyl		0.8	.5U					NA
Parathion, Methyl		2.2	1U					NA
PCB	0.5	1600	10U**					1K***
Phosdrin (Mevinphos)		2.3	1U					NA
Volatile Organics								
Acetone							10U	I
Carbon Disulfide							5U	1.7,{1K}
1,1-Dichloroethane							U	1.2,{1.1}
1,2-Dichloroethene	170*						5U	1K
1,1,1-Trichloroethane	200						U/18	2.4,{2.7}
1,1,2-Trichloroethane	[5]						5U	1K
1,2-Dichloroethane	5						5U	2.6,{2.2}
2-Butanone (MEK)							10U	I
Trichloroethene	5						5U	1K
Benzene	5						5U/13	1K
Chlorobenzene	100						5U/6.1	5.3,{6.5}
Ethylbenzene	700						5U	1K
Xylene (Xylol)	10000	NA	NA				5U	1K
Semi-Volatiles								
None Detected								****
Metals								
Total Arsenic	50	56	59				0.014/10	8.9,{8}
Dissolved Arsenic							5.2/10U	4.5,{4.3}

Note:

Total Arsenic minimum for 1992 is believed to be in mg/L rather than the ug/L reported.

\*\* Individual Aroclors (PCB-1242, -1254, -1221, -1232, -1248, -1260) were analyzed.

\*\*\* Aroclor detection limits of 1K except Ar-1221 was 2K.

\*\*\*\* Semi-volatiles were analyzed but none detected; coded "K" at detection rates of 10 to 25 ug/L.



Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-7

Analyte (ug/L)	MCL	WCC Feb. 1981	WCC Aug. 1981	WCC July 1982	WCC Oct. 1982	WCC 1983	WCC No Data after 1983
<b>Herbicides</b>							
2,4,5-T		0.2	3.9	NA	5U	.1U/48.4	
2,4-D	70	2.6	7.4	180	5U	1.3/106	
2,4,5-TP (Silvex)	50	NA	3.9	94	NA	NA	
<b>Pesticides</b>							
alpha-BHC							
beta-BHC							
delta-BHC							
gamma-BHC (Lindane)	0.2	1880	410	67.9	373	36.9/407	
4,4'-DDD		.2U	12.3	NA	NA	NA	
4,4'-DDE		.2U	.2U	NA	NA	NA	
4,4'-DDT		0.3	8.8	NA	NA	NA	
Aldrin		63.3	26	8.05	.1U	2.78/62.7	
Dieldrin		.2U	6.25	0.1	7.6	.1U/7.05	
Diazinon		427	.5U	NA	NA	NA	
Endrin	2	.4U	.4U	NA	NA	NA	
Chlordane	2	1U	1U	NA	NA	NA	
Heptachlor	0.4	.1U	.2U	NA	NA	NA	
Methoxychlor	40	.8U	.8U	NA	NA	NA	
Toxaphene	3	10U	10U	NA	NA	NA	
Malathion		100	1U	NA	NA	NA	
Parathion, Ethyl		12.9	0.5U	NA	NA	NA	
Parathion, Methyl		6.1	1U	NA	NA	NA	
PCB	0.5	10U	10U**	NA	NA	NA	
Phosdrin (Mevinphos)		7.9	1U	NA	NA	NA	
<b>Volatile Organics</b>							
Acetone							
Chlorobenzene	100						
1,2-Dichloroethene	170*						
1,1,2-Trichloroethane	[5]						
Trichloroethene	5						
Xylene (Xylol)	10000	NA	NA	121	500U	320/390	
<b>Metals</b>							
Total Arsenic	50	130	880	360	260	82/130	
Dissolved Arsenic		NA	NA	NA	NA	NA	

Note:

\*\* Individual Aroclors (PCB-1242, -1254, -1221, -1232, -1248, -1260) were analyzed.

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-8

Analyte (ug/L)	MCL	WCC Feb. 1981	WCC Aug. 1981	WCC No data for 1982-1991			WCC 1992	EPA Jun-92	EPA Dec-92
Herbicides									
2,4,5-T		9.7	NA				10U	0.89	8U
2,4-D	70	87.8	1U				60U	.5U	8U
2,4,5-TP (Silvex)	50	NA	0.22				51/59	34	74J
Pesticides									
alpha-BHC							55/160	75	130J
beta-BHC							5U	5.6	14J
delta-BHC							43/120	50	120J
gamma-BHC (Lindane)	0.2	184	32.6				80/400	110	270J
4,4'-DDD		.2U	.2U				40U	.038U	5K
4,4'-DDE		.2U	.2U				40U	.03U	5K
4,4'-DDT		.3U	.3U				40U	.17U	5K
Aldrin		4.59	.2U				20U	.95U	2.5K
Dieldrin		1.45	.2U				40U	2.2	5K
Diazinon		37.8	0.78				NA	NA	NA
Endrin	2	.4U	.4U				40U	.1U	5K
Endrin Ketone								0.25	5K
Chlordane	2	1U	1U				200U	.1U	2.5K
Heptachlor	0.4	.1U	.2U				20U	.045U	2.5K
Heptachlor Epoxide	0.2							1.2	2.5K
Methoxychlor	40	.8U	.8U				200U	.05U	25K
Toxaphene	3	10U	10U				2000U	2.5U	250K
Parathion, Ethyl		2.5	0.5U						
Parathion, Methyl		1.6	1U						
Volatile Organics									
Acetone		NA	NA				25U	7U	65J
Carbon Disulfide							12U	17	10K
Chloromethane							U	2U	28J
1,1-Dichloroethane							U	1	10K
1,2-Dichloroethene	170*						12U	1U	10K
1,2-Dichloroethane	5						12/34U	11	10K
1,1,1-Trichloroethane	200						25U	1U	10K
1,1,2-Trichloroethane	[5]						12U	1U	10K
2-Butanone (MEK)							67U	2U	10K
Trichloroethene	5						12U	2	10K
Benzene	5						320/820	260	310J
Toluene	1000						U	2	10K
Chlorobenzene	100						360/960	290	350
Ethylbenzene	700						14/37	12	19J
4-Methyl-2-Pentanone							U/66	41	51J
Xylenes (Xylol)	10000						12U/410	17	61J
Semivolatiles									
2-Chlorophenol							NS	20U	41
1,4-Dichlorobenzene	75						NS	39	40
1,2-Dichlorobenzene							NS	20U	16
Isophorone							NS	85	98
Metals									
Total Arsenic	50	5	12				0.086/110	51	130
Dissolved Arsenic							0.11/97	61.5	94

Note: Arsenic data minimums for 1992 believed to be in mg/L not in the ug/L reported.

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-9

Analyte (ug/L)	MCL	WCC 1981	WCC No data for 1982-1991				WCC 1992
Herbicides							
2,4,5-T		.1U					.2U
2,4-D	70	1U					1.2U
2,4,5-TP (Silvex)	50	.1U					.17U
Pesticides							
alpha-BHC							.05U
beta-BHC							.05U/0.076
delta-BHC							.05U
gamma-BHC (Lindane)	0.2	0.45/0.82					.05U
4,4'-DDD		0.91/1.08					0.16/0.76
4,4'-DDE		0.19/0.22					0.1U/0.4
4,4'-DDT		0.53/0.84					0.15/0.73
Aldrin		.2U/.26					.05U
Dieldrin		0.41/0.55					0.1U/0.16
Diazinon		0.5U					
Endrin	2	.4U					.1U
Chlordane	2	1U					.5U
Heptachlor	0.4	.1U					.05U
Methoxychlor	40	.8U					.5U
Toxaphene	3	10U					5U
Malathion		1U					
E. Parathion		.5U					
M. Parathion		1U					
Volatile Organics							
Acetone							10U
Carbon Disulfide							5U
1,2-Dichloroethene	170*						5U
1,1,1-Trichloroethane	200						5U
1,1,2-Trichloroethane	[5]						5U
1,2-Dichloroethane	5						5U
2-Butanone							10U
Trichloroethene	5						5U
Benzene	5						5U
Chlorobenzene	100						5U
Ethylbenzene	700						5U
4-Methyl-2-Pentanone							10U
Xylene	10000						5U
Metals							
Total Arsenic	50	4/5					5U/6.6
Dissolved Arsenic							5U

## Well: OWC-12A (Page 1)

[illegible]

Historical Groundwater Data from the Ortho-Chevron Facility

Well: OWC-12A (Page 2)

Analyte (ug/L)	MCL	WCC 1989	WCC 1990	EPA Jun-90	WCC 1991	EPA Jun-91
<b>Herbicides</b>						
2,4,5-T			2U	1U	.4U	3.9U
2,4-D	70		12U	I	2.4U	15U
2,4,5-TP (Silvex)	50		1.7U/19	I	1.8/3,{2/2.1}	3.4
<b>Pesticides</b>						
alpha-BHC			160	200	180/210,{170/220}	190
beta-BHC			21	18	33/100U {31}	24
delta-BHC			160	170	240/250,{230/250}	210
gamma-BHC (Lindane)	0.2	420/430	260/350	340	240/350,{230/360}	270
4,4'-DDD		3	20U	2.6	40U	3
4,4'-DDE		1.2	20U	0.82	40U	1.7U
4,4'-DDT		1.7/12	20U	1.6	40U	3.3
Aldrin		3.5/6.2	10U	.5U	20U	3.5
Dieldrin		3.6	20U	1.7	40U	3.9
Endrin	2		20U	0.91	NA	2.3
Endosulfan I				.05U		1.7
Endrin Ketone				1.1		NA
Chlordane	2		10U	.5U	NA	NA
Heptachlor	0.4		10U		NA	.83U
Methoxychlor	40		100U	2.2	NA	NA
Toxaphene	3		1000U		NA	17U
<b>Volatile Organics</b>						
Vinyl Chloride	2		U	14J	U	50U
Acetone			U	10U	200U/500,{720}	50U
Carbon Disulfide			25U		U	25U
1,1-Dichloroethene	7		U	7J	U	25U
1,2-Dichloroethene	170*		U		100U	25U
Chloroform			U	26J	U	25U
1,2-Dichloroethane	5		31	39J	100U	25U
Trichloroethene	5		U	5J	100U	25U
1,1,2-Trichloroethane	[5]		84	99J	100U	77
2-Butanone (MEK)						
Benzene	5		100	120J	U	95
Tetrachloroethene	5		U	7J	U	25U
Toluene	1000		U	5J	U	25U
Chlorobenzene	100		650	810J	610/850,{600/850}	660
Ethylbenzene	700		130	100J	U	110
Styrene						25U
Xylene	10000		620/720	960J	720,{400/700}	430
<b>Semivolatiles</b>						
1,4-Dichlorobenzene	75	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	600	NS	NS	NS	NS	NS
1,2,4-Trichlorobenzene		NS	NS	NS	NS	NS
Naphthalene		NS	NS	NS	NS	NS
2-Methylnaphthalene		NS	NS	NS	NS	NS
<b>Metals</b>						
Total Arsenic	50		5U	10U	5U/7.8,{5U}	10U
Dissolved Arsenic			5U	10U	5U	10U

Historical Groundwater Data from the Ortho-Chevron Facility

Well: OWC-12A (Page 3)

Analyte (ug/L)	MCL	WCC 1992	EPA Jun-92	EPA Dec-92
Herbicides				
2,4,5-T		.8U,{.2U}	.2U	.39U
2,4-D	70	4.8U/23,{1.2U/18}	18,{28}	.39U
2,4,5-TP (Silvex)	50	3.2/3.7,{.17U/3.6}	3.8,{4.3}	4.7J
Pesticides				
alpha-BHC		180/230, {170/210}	210 {220}	170J
beta-BHC		27/50U,{25/50U}	35 {37}	27
delta-BHC		230/290,{210/260}	260 {270}	230J
gamma-BHC (Lindane)	0.2	260/310,{240/280}	330 {340}	200J
4,4'-DDD		40U,{33U}	14 {11}	5K
4,4'-DDE		40U,{33U}	1.2U	5K
4,4'-DDT		40U,{33U}	2.1 {2.1}	5K
Aldrin		20U,{17U}	7.3 {8}	2.5K
Dieldrin		40U,{33U}	4.3 {4.2}	5K
Endrin	2	NA, {100U}	3.9 {3.8}	5K
Endosulfan I			.18U	2.5K
Endrin Ketone			2.7 {3.1}	5K
Chlordane	2	NA, {500U}	.4U	2.5K
Heptachlor	0.4	NA, {50U}	1.1U	2.5K
Methoxychlor	40	NA, {500U}	10 {11}	25K
Toxaphene	3	NA, {5000U}	10U	250K
Volatile Organics				
Vinyl Chloride	2	U	28 {29}	23J
Acetone		200U	10U {9U}	10K
Carbon Disulfide		100U, {50U}	1U	10K
1,1-Dichloroethene	7	U	7 {6}	10K
1,2-Dichloroethene	170*	50U	1U	10K
Chloroform		U	24 {20}	21J
1,2-Dichloroethane	5	50U	33 {32}	36J
Trichloroethene	5	50U	6 {5}	10K
1,1,2-Trichloroethane	[5]	72/100U,{61/71}	86J {82J}	79J
2-Butanone (MEK)		U	2U	10J
Benzene	5	120/250,{120/160}	140 {140}	150J
Tetrachloroethene	5	U	10 {10}	10K
Toluene	1000	U	7 {7}	10K
Chlorobenzene	100	840/930,{890/920}	1100 {940}	890
Ethylbenzene	700	120/140,{120/130}	120 {120}	80J
Styrene		U	13 {12}	10K
Xylene	10000	700/790,{670/790}	477 {498}	640
Semivolatiles				
1,4-Dichlorobenzene	75	NS	67 {75}	110
1,2-Dichlorobenzene	600	NS	20U	37J
1,2,4-Trichlorobenzene		NS	54 {48}	33J
Naphthalene		NS	230 {200}	410
2-Methylnaphthalene		NS	65 {69}	120
Metals				
Total Arsenic	50	5U	50U	1.7U
Dissolved Arsenic		5U	50U	1.4

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-13

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC 1983	WCC No Data for 1984 -1991			WCC 1992
Herbicides								
2,4,5-T		0.8/2.1	5U	.1U/172				10U
2,4-D	70	1.3/3.7	5U	1U/105				60U
2,4,5-TP (Silvex)	50	2.1	1U	1.91				33
Pesticides								
alpha-BHC								62
beta-BHC								10U
delta-BHC								100
gamma-BHC (Lindane)	0.2	234/2300	54.7/308	20.9/393				39
4,4'-DDD		0.3/1.4	NA	NA				20U
4,4'-DDE		.2U/0.35	NA	NA				20U
4,4'-DDT		.3U	NA	NA				20U
Aldrin		.2U/16.3	.1U	.1U/63.6				10U
Dieldrin		.2U/1.06	.1U/2.7	.1U/2.37				20U
Diazinon		.5U	NA	25U				
Endrin	2	0.2/0.4	NA	NA				NA
Chlordane	2	1U	NA	NA				NA
Heptachlor	0.4	1U/2.43	NA	NA				NA
Methoxychlor	40	.8U	NA	NA				NA
Toxaphene	3	10U	NA	NA				NA
Malathion		1U/2U	NA	NA				
Ethyl Parathion		.5U	NA	NA				
Methyl Parathion		.5U	NA	NA				
Phosdrin (Mevinphos)		2U/3.1	NA	NA				
Volatile Organics								
Acetone								50U
Carbon Disulfide								25U
1,2-Dichloroethene	170*							25U
1,2-Dichloroethane	5							25U
2-Butanone								50U
Trichloroethene	5							25U
1,1,1-Trichloroethane	200							25U
1,1,2-Trichloroethane	[5]							25U
Benzene	5							25U
Chlorobenzene	100							610
Ethylbenzene	700							25U
Xylene (Xylol)	10000	NA	10U	23/108				25U
Metals								
Total Arsenic	50	1U/2	1.3/1.4	1.5/3.7				13
Dissolved Arsenic								10U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-14 (Page 1)

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC 1983	WCC 1984	WCC 1985	WCC 1986	WCC 1987
<b>Herbicides</b>								
2,4,5-T		.1U	NS	1U	1U/42	1U	1U	1U
2,4-D	70	1U	NS	1.27/5U	1U/50.9	1U	1U	1U
2,4,5-TP (Silvex)	50	.1U	NS	1U	1U	NA	NA	
<b>Pesticides</b>								
alpha-BHC								
beta-BHC								
delta-BHC								
gamma-BHC (Lindane)	0.2	0.93/3.56	NS	1.2/3.9	1.07/2.2	0.73/1.28	0.62	44/1.6
4,4'-DDD		.2U/0.5	NS	1U	.1U/0.74	.1U	.1U	.1U/.83
4,4'-DDE		.2U/0.2	NS	1U	.1U/0.21	.1U	.1U	.1U
4,4'-DDT		.3U	NS	1U	.1U/0.34	.1U	.1U	.1U
Aldrin		.2U/0.88	NS	.1U/0.25	.1U/0.53	.1U/0.12	.1U	.1U/.21
Dieldrin		.2U/0.65	NS	1U/1.2	0.4/0.97	0.32/0.56	.1U	.1U/.59
Diazinon		.5U	NS	25U				
Endrin	2	.4U	NS	.1U	.1U	.1U	.1U	
Chlordane	2	1U	NS	5U	5U	.1U/5U	.1U	
Heptachlor	0.4	.1U	NS	.1U	.1U	.1U	.1U	
Methoxychlor	40	.8U	NS		5U	5U	5U	
Toxaphene	3	10U	NS	5U	5U	5U	5U	
<b>Volatile Organics</b>								
Acetone								
Carbon Disulfide								
1,2-Dichloroethene	170*							
1,1,1-Trichloroethane	200							
1,1,2-Trichloroethane	[5]							
1,2-Dichloroethane	5							
2-Butanone (MEK)								
Trichloroethene	5							
Benzene	5							
Chlorobenzene	100							
Ethylbenzene	700							
Xylene (Xylol)	10000	NA		1U	1U	1U/3.4	1U	1U
<b>Metals</b>								
Total Arsenic	50	1U/8	NS	2.7/3.5	1.3/8.5	2/4	2	
Dissolved Arsenic								10U



Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-14 (Page 2)

Analyte (ug/L)	MCL	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992	WCC 1993
<b>Herbicides</b>							
2,4,5-T		1U		.4U	.2U	.2U	
2,4-D	70	1U		.6U	1.2U	1.2U	
2,4,5-TP (Silvex)	50			1.7/2.6	0.58/0.62	.17U/0.95	
<b>Pesticides</b>							
alpha-BHC				0.7	0.75/0.99	.2U/2.1	
beta-BHC				0.6	0.77/1.2	0.59/1.3	
delta-BHC				0.39	0.3/0.41	.2U/0.65	
gamma-BHC (Lindane)	0.2	74/2.71	0.55	25/.26	0.27/.034	.2U/0.76	
4,4'-DDD		.1U/.105		.1U	.2U	.2U	
4,4'-DDE		.1U		.1U	.2U	.2U	
4,4'-DDT		.1U	0.26	.1U	.2U	.2U	
Aldrin		.1U/4.27	D (<2.5)	.05U	.1U	.2U	
Dieldrin		.1/5.7	D (.14-.26)	.47/.5	0.39/0.54	.4U/0.53	
Diazinon							
Endrin	2					NA	
Chlordane	2					NA	
Heptachlor	0.4					NA	
Methoxychlor	40	.5U				NA	
Toxaphene	3	5U				NA	
<b>Volatile Organics</b>							
Acetone					10U	10U	
Carbon Disulfide					U	5U	
1,2-Dichloroethene	170*				U	5U	
1,1,1-Trichloroethane	200				U	5U	
1,1,2-Trichloroethane	[5]				5U	5U	
1,2-Dichloroethane	5				U	5U	
2-Butanone (MEK)					U	10U	
Trichloroethene	5				5U	5U	
Benzene	5				U	5U	
Chlorobenzene	100				5U	5U/8.3	
Ethylbenzene	700				U	5U	
Xylene (Xylol)	10000	1U		5U	5U	5U	
<b>Metals</b>							
Total Arsenic	50		5	7.8/25U	10U/11	0.0052/7.5	
Dissolved Arsenic		10U		10U/13	5U/6.6	10U	

Note: Total Arsenic 1992 minimum is believed to be in mg/L rather than the ug/L reported.

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-15 (Page 1)

Analyte (ug/L)	MCL	WCC 1981	WCC 1983	WCC 1985	WCC 1986	WCC 1987
<b>Herbicides</b>						
2,4,5-T		.1U	1U			1U
2,4-D	70	1U	1U			1U
2,4,5-TP (Silvex)	50	.1U	1U			
<b>Pesticides</b>						
alpha-BHC						
beta-BHC						
delta-BHC						
gamma-BHC (Lindane)	0.2	0.23/0.38	0.43			.19/.35
4,4'-DDD		.2U	NA			.1U
4,4'-DDE		.2U	NA			.1U
4,4'-DDT		.2U	NA			.1U
Aldrin		.12U	.1U			.1U
Dieldrin		.2U/0.21	0.34			.1U/.25
Diazinon		.5U	25U			
Endrin	2	.2U	NA			
Chlordane	2	1U	NA			
Heptachlor	0.4	.1U	NA			
Methoxychlor	40	.8U	NA			
Toxaphene	3	10U	NA			
Malathion		1U	NA			
Ethyl Parathion		.5U	NA			
Methyl Parathion		1U	NA			
<b>Volatile Organics</b>						
Acetone						
Carbon Disulfide						
1,2-Dichloroethene	170*					
1,1,1-Trichloroethane	200					
1,1,2-Trichloroethane	[5]					
1,2-Dichloroethane	5					
2-Butanone (MEK)						
Trichloroethene	5					
Benzene	5					
Chlorobenzene	100					
Ethylbenzene	700					
Xylene (Xylol)	10000	NA	1U			1U
<b>Metals</b>						
Total Arsenic	50	1U/1	2			
Dissolved Arsenic						10U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-15 (Page 2)

Analyte (ug/L)	MCL	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992	WCC 1993
<b>Herbicides</b>							
2,4,5-T		1U		.2U	.2U	.2U	
2,4-D	70	1U		1.2U	1.2U	1.2U	
2,4,5-TP (Silvex)	50			.17U	.17U	.17U	
<b>Pesticides</b>							
alpha-BHC				0.15	0.14/0.15	0.055/0.2	
beta-BHC				.05U	.05U	.05U	
delta-BHC				0.12	.05U/0.13	.05U/0.39	
gamma-BHC (Lindane)	0.2	14/.35	0.25	.13/.19	0.13/0.16	.05U/0.31	
4,4'-DDD		.1U		.1U	.1U	.1U	
4,4'-DDE		.1U		.1U	.1U	.1U	
4,4'-DDT		.1U		.1U	.1U	.1U	
Aldrin		.1U		.05U	.05U	.05U	
Dieldrin		.1U/.20	D(.14-.26)	.17/.20	0.31/0.33	0.2/0.22	
Diazinon							
Endrin	2					NA	
Chlordane	2					NA	
Heptachlor	0.4					NA	
Methoxychlor	40	.5U				NA	
Toxaphene	3	5U				NA	
Malathion							
Ethyl Parathion							
Methyl Parathion							
<b>Volatile Organics</b>							
Acetone					10U	10U/14	
Carbon Disulfide					U	5U/12	
1,2-Dichloroethene	170*				U	5U	
1,1,1-Trichloroethane	200				U	5U	
1,1,2-Trichloroethane	[5]				5U	5U	
1,2-Dichloroethane	5				U	5U	
2-Butanone (MEK)					U	10U	
Trichloroethene	5				5U	5U	
Benzene	5				U	5U	
Chlorobenzene	100				5U	5U	
Ethylbenzene	700				U	5U	
4-Methyl-2-Pentanone					U	10U	
Xylene (Xylol)	10000	1U		5U	5U	5U	
<b>Metals</b>							
Total Arsenic	50			5U	5U	5U	
Dissolved Arsenic		10U		5U	5U	5U	

Note:

D = Detected within range indicated according to WCC report text.

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-16 (Page 1)

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC 1983	WCC 1984	WCC 1985	WCC 1986	WCC 1987
<b>Herbicides</b>								
2,4,5-T		NA	NA	1U	1U	1U	1U	1U
2,4-D	70	3.8	NA	1U	1U	1U	1U	1U
2,4,5-TP (Silvex)	50	3.3	NA	7.5	NA	NA	NA	
<b>Pesticides</b>								
alpha-BHC								
beta-BHC								
delta-BHC								
gamma-BHC (Lindane)	0.2	0.91	NA	0.31/0.50	0.66/0.90	0.65/1.15	0.53	.1U/.60
4,4'-DDD		.2U	NA	1U	.1U	.1U	.1U	.1U
4,4'-DDE		.2U	NA	1U	.1U/0.55	.1U/0.14	.1U	.1U
4,4'-DDT		.3U	NA	1U	.1U	.1U	1.2	.1U
Aldrin		.2U	NA	.1U	.1U/4.45	.1U	.1U	.1U/4.69
Dieldrin		0.27	NA	0.35/1U	.1U/0.44	.1U	1.25	.1U
Diazinon		0.63	NA	25U	NA	NA	NA	
Endrin	2	.2U	NA	.1U	.1U	.1U	.1U	
Chlordane	2	1U	NA	5U	5U	.1U/5U	.1U	
Heptachlor	0.4	2	NA	1.59	.1U/1.43	.1U/1.75	.1U	
Methoxychlor	40	.8U	NA	5U	5U	5U	5U	
Toxaphene	3	10U	NA	5U	5U	5U	5U	
Malathion		1U	NA	NA	NA			
Ethyl Parathion		.6U	NA	NA	NA			
Methyl Parathion		1U	NA	NA	NA			
<b>Volatile Organics</b>								
Acetone								
Carbon Disulfide								
1,2-Dichloroethene	170*							
1,1,1-Trichloroethane	200							
1,1,2-Trichloroethane	[5]							
1,2-Dichloroethane	5							
2-Butanone (MEK)								
Trichloroethene	5							
Benzene	5							
Chlorobenzene	100							
Ethylbenzene	700							
Xylene (Xylol)	10000	NA	NA	1U	.1U/1.6	1U	1U	1U
<b>Metals</b>								
Total Arsenic	50	14	NA	3.1/5.9	1.2/1.4	1U	1U	
Dissolved Arsenic								10U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-16 (Page 2)

Analyte (ug/L)	MCL	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992	WCC 1993
<b>Herbicides</b>							
2,4,5-T		1U		.2U	.8U	.4U	
2,4-D	70	1U		1.2U	4.8U	2.4U	
2,4,5-TP (Silvex)	50			.17U/2.5	2.9/3.1	1.6/2.1	
<b>Pesticides</b>							
alpha-BHC				5.8	0.9/4.5	3.5/4	
beta-BHC				1.3	0.41/1.6	1.5/2	
delta-BHC				1.6	0.28/1.4	0.73/1.5	
gamma-BHC (Lindane)	0.2	1U/1.58	0.11	.5U	.05U	.25U	
4,4'-DDD		.1U/.132	0.39	1U	.1U	.5U	
4,4'-DDE		.1U		1U	.1U	.5U	
4,4'-DDT		.1U		1U	.1U	.5U	
Aldrin		.1U/3.4	D (<2.5)	.5U	.05U	.25U	
Dieldrin		.1U	0.14	1U	.1U	.5U	
Diazinon							
Endrin	2					NA	
Chlordane	2	1U/0.167				NA	
Heptachlor	0.4					NA	
Methoxychlor	40					NA	
Toxaphene	3					NA	
Malathion							
Ethyl Parathion							
Methyl Parathion							
<b>Volatile Organics</b>							
Acetone					10U	10U	
Carbon Disulfide					U	5U	
1,2-Dichloroethene	170*				U	5U	
1,1,1-Trichloroethane	200				U	5U	
1,1,2-Trichloroethane	[5]				5U	5U	
1,2-Dichloroethane	5				U	5U	
2-Butanone (MEK)					U	10U	
Trichloroethene	5				5U	5U	
Benzene	5				U	5U	
Chlorobenzene	100				5U	5U	
Ethylbenzene	700				U	5U	
4-Methyl-2-Pentanone						5U	
Xylene (Xylol)	10000	1U		5U	5U	5U	
<b>Metals</b>							
Total Arsenic	50		5	5U	10U	5U	
Dissolved Arsenic		10U/50		5U	5U	5U	

Note:

D = Detected at <2.5 ug/L according to text of WCC report.

## Well: OWC-17 (Page 1)

[illegible]

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-17 (Page 2)

Analyte (ug/L)	MCL	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992	EPA Dec-92
Herbicides							
2,4,5-T		1U		4U	4U	2U	.96U
2,4-D	70	1U/14		24U	12U	12U	.96U
2,4,5-TP (Silvex)	50		40	17U/17	8.5/12	9.1/18	17J
Pesticides							
alpha-BHC				40	30/61	44/52	5.1J
beta-BHC				6.6	2.5U/15	14/21	1.9J
delta-BHC				50	16/93	83/120	12J
gamma-BHC (Lindane)	0.2	69.1/84	47/59	25/40	16/33	22/26	2.1J
4,4'-DDD		.1U		10U	5U	10U	.1K
4,4'-DDE		.1U	1	10U	5U	10U	0.13J
4,4'-DDT		.1U/3.7		10U	5U	10U	.1K
Aldrin		.1U/12	2.5	5U	2.5U	4.8J/5U	.44J
Dieldrin		.1U	1	10U	5U	10U	.1K
Diazinon							NA
Endrin	2					NA	.1K
Chlordane	2					NA	.05K
Heptachlor	0.4					NA	.05K
Methoxychlor	40	12U				NA	.5K
Toxaphene	3	5U				NA	5K
Malathion							NA
Ethyl Parathion							NA
Methyl Parathion							NA
Volatile Organics							
Acetone				U	100/200U	50U	10K
Carbon Disulfide				U	U	25U	10K
1,2-Dichloroethene	170*			U	U	25U	10K
1,2-Dichloroethane	5			25U	U	25U	11J
2-Butanone (MEK)				U	U	50U	10K
Trichloroethene	5			U	100U	25U	10K
1,1,1-Trichloroethane	200			U	U	25U	10K
1,1,2-Trichloroethane	[5]			25U	100U	25U	10K
Benzene	5			25U	U	25U	12J
Chlorobenzene	100			420	310/540	540/690	550
Ethylbenzene	700			25U	U	25U	10K
Xylene (Xylol)	10000	1U/5.8		5U/25U	12U/100U	25U	10K
Semi-Volatiles							
1,4-Dichlorobenzene	75						75
1,2-Dichlorobenzene	600						28
4-Chloro-3-Methyl Phenol							38
Bis(2-ethylhexyl) Phthalate							12
Metals							
Total Arsenic	50		9/17	18/25U	21/68	10U/16	14
Dissolved Arsenic		10U	7/11	10U/15	19/62	0.11/11	11

Note: Total Arsenic 1992 minimum may not be in ug/L.

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-18 (Page 1)

Analyte (ug/L)	MCL	WCC 1981	WCC 1982	WCC 1983	WCC 1984	WCC 1985	WCC 1986	WCC 1987
<b>Herbicides</b>								
2,4,5-T		2.4	5U	.1U	1U	1U	1U	1U
2,4-D	70	1.1	5U	.1U	1U/3.1	1U	1U	1U/2.1
2,4,5-TP (Silvex)	50	2.4	1U	NA	NA	NA	NA	
<b>Pesticides</b>								
alpha-BHC								
beta-BHC								
delta-BHC								
gamma-BHC (Lindane)	0.2	58	1.37/8.1	.1U/6.34	2.29/6.93	2.46/3.48	2.63	2.44/155
4,4'-DDD		0.77	NA	1.7	.1U/2.08	0.16/0.5	0.48	.1U
4,4'-DDE		.2U	NA	1U	.1U/0.95	.1U/0.17	0.16	.1U/.28
4,4'-DDT		0.45	NA	1U	.1U/3	.1U	.1U	.1U/.36
Aldrin		0.77	2.5/2.7	.1U/1.78	0.4/1.35	.1U	0.59	.1U/12.6
Dieldrin		1.2	.1U/0.93	.1U/2.68	0.23/1.39	0.19/0.29	.22U	.19/.31
Diazinon		0.84	NA	NA	NA	NA	NA	
Endrin	2	.4U	NA	.1U	.1U	.1U	.1U	
Chlordane	2	1U	NA	5U	5U	.1U/5U	.1U	
Heptachlor	0.4	.2U	NA	.1U	.1U	.1U	.1U	
Methoxychlor	40	.8U	NA	5U	5U	5U	5U	
Toxaphene	3	10U	NA	5U	5U	5U	5U	
Malathion		1U	NA	NA	NA	NA	NA	
Ethyl Parathion		.5U	NA	NA	NA	NA	NA	
Methyl Parathion		1U	NA	NA	NA	NA	NA	
<b>Volatile Organics</b>								
Vinyl Chloride	2							
Acetone								
Carbon Disulfide								
1,1-Dichloroethene	7							
1,2-Dichloroethene	170*							
Chloroform								
1,2-Dichloroethane	5							
Trichloroethene	5							
1,1,2-Trichloroethane	[5]							
Benzene	5							
Tetrachloroethene	5							
Toluene	1000							
Chlorobenzene	100							1U/67.4
Ethylbenzene	700							
Xylene (Xylol)	10000	NA	10U	1U/9	1U/42.2	1U/15.6	1U	
<b>Metals</b>								
Total Arsenic	50	30	4.1/8.4	17/46	3.7/17	1U/9	5	
Dissolved Arsenic								10U



Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-18 (Page 2)

Analyte (ug/L)	MCL	WCC 1988	WCC 1989	WCC 1990	EPA Jun-90	WCC 1991	EPA Jun-91	WCC 1992	EPA Jun-92
<b>Herbicides</b>									
2,4,5-T		1U		.2U	.2U	.2U	3.9U	.2U	.2U
2,4-D	70	1U		1.2U	1U	1.2U	15U	1.2U/4.8	4.6
2,4,5-TP (Silvex)	50			.34/.38	1	0.56/0.71	1.3J	0.76/0.99	1.1
<b>Pesticides</b>									
alpha-BHC				5.6	6.8	7.3/8.2	8.2	7.1/8	7
beta-BHC				.5U	0.2	.5U/0.88	.5U	.5U	0.28
delta-BHC				1.8	2.9	2.9/3	3.1	2.4/3.2	2
gamma-BHC (Lindane)	0.2	1.2/3.51	2.9	.87/1.6	1.8	1.2/1.7	1.4	1.3/2.4	1.9
4,4'-DDD		.1U/1.32	.27/.45	1U	.1U	1U	1U	1U	.06U
4,4'-DDE		.1U	U/.27	1U	.1U	1U	1U	1U	0.13
4,4'-DDT		.1U	.13/.32	1U	.1U	1U	1U	1U	0.19
Aldrin		.1U	.1/.2	.5U	.5U	.5U	.5U	.5U	0.16
Dieldrin		.1U/1.75	.33/.42	1U	.1U	1U	1U	1U	0.21
Endrin	2	.1U			.1U	NA	1U	NA	.02U
Endosulfan I					.05U		.5U		.009U
Endrin Ketone					.1U				.005U
Chlordane	2	.1U/.405			.5U	NA	NA	NA	.02U
Heptachlor	0.4	.1U				NA	.5U	NA	.009U
Methoxychlor	40	.5U			.5U	NA		NA	.01U
Toxaphene	3	5U				NA	10U	NA	.05U
<b>Volatile Organics</b>									
Vinyl Chloride	2				10U	U	10U	U	11J
Acetone					10U	10U	10U	10U	5U
Carbon Disulfide				5U		U	5U	5U	1U
1,1-Dichloroethene	7				5U	U	5U	U	1U
1,2-Dichloroethene	170*					5U/15	5U	5U	1U
Chloroform					5U	U	5U	U	1U
1,2-Dichloroethane	5			15	19	U/11	13	12/15	16
Trichloroethene	5				5U	5U	5U	5U	3
1,1,2-Trichloroethane	[5]			17	21	12 / 20	16	13/18	20J
Benzene	5			5U	5U	U	5U	5U	4
Tetrachloroethene	5				5U	U	5U	U	1U
Toluene	1000				5U	U	5U	U	1U
Chlorobenzene	100			110	100J	100/150	120	120/140	140
Ethylbenzene	700			5U	5U	U	5U	5U	1U
Xylene	10000	1U		5U	5U	5U	5U	5U	2
<b>Semivolatiles</b>									
None Detected		NS	NS	NS	NS	NS	NS	NS	U
<b>Metals</b>									
Total Arsenic	50		23/28	5U	10U	7.4/10	10U	6/9.8	50U
Dissolved Arsenic		10U	5U/90	5U	10U	5U	10U	5U	50U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-19 (Page 1)

Analyte (ug/L)	MCL	WCC 1983	WCC 1986	WCC 1987	WCC 1988	WCC 1989	WCC 1990	EPA Jun-90
<b>Herbicides</b>								
2,4,5-T		5.3/7.3	4.2	1U/3.6	1U		.8U	.2U
2,4-D	70	5U	1U	1U	1U/5.9		4.9/120U	1U
2,4,5-TP (Silvex)	50					30	1.7/35	43J
<b>Pesticides</b>								
alpha-BHC							99	68
beta-BHC							19	7.2
delta-BHC							10U	3
gamma-BHC (Lindane)	0.2	47.2/72.2	34.8	105/212	137/180	110/130	130/140	100
4,4'-DDD		1U/2.02	0.19	.1U/.16	.1U		20U	.1U
4,4'-DDE		1U/3.96	.1U	.1U	.1U/.269		20U	.1U
4,4'-DDT		1U/5.74	0.26	.1U	.1U/.863		20U	.1U
Aldrin		.1U/2.94	3.31	3.69/15.2	6.15/20		10U	.5U
Dieldrin		7.6/9.61	0.63	.23/.58	.1U/.875		20U	0.39
Endrin	2	.1U/1.7	.1U					.1U
Endosulfan I								0.1
Endrin Ketone								0.38
Chlordane	2	5U	.1U		.1U/.450			.5U
Heptachlor	0.4	.1U/4.9	.1U		.1U/.101			
Methoxychlor	40	5U	5U		5U			.5U
Toxaphene	3	5U	5U		5U			
<b>Volatile Organics</b>								
Vinyl Chloride	2						U	10U
Acetone							U	10U
Carbon Disulfide							8.5U	U
1,1-Dichloroethene	7						U	5U
1,1-Dichloroethane							U	U
1,2-Dichloroethene	170*						U	U
Chloroform				1			U	5U
1,2-Dichloroethane	5						8.5U	9
Trichloroethene	5						U	11
1,1,1-Trichloroethane	200						U	U
1,1,2-Trichloroethane	[5]						10	12
Benzene	5						8.5U	5U
Tetrachloroethene	5						U	5U
Toluene	1000						U	5U
Chlorobenzene	100						160	7J
Ethylbenzene	700						8.5U	5U
4-Methyl-2-Pentanone								
Xylene (Xylol)	10000	1U/30	1U	1U	1U/5U		5U	5U
<b>Semivolatiles</b>								
1,4-Dichlorobenzene	75	NS	NS	NS	NS	NS	NS	NS
<b>Metals</b>								
Total Arsenic	50	55800/66700	40			13000/18000	15100/19500	1800J
Dissolved Arsenic				8000/22000	2800/19000	14000/17000	14800/22100	10U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-19 (Page 2)

Analyte (ug/L)	MCL	WCC 1991	EPA Jun-91	WCC 1992	EPA Jun-92	EPA Dec-92	WCC 1993	EPA Jun-93
<b>Herbicides</b>								
2,4,5-T		4U	3.9U	.2U	.2U	I		
2,4-D	70	24U	15U	1.2U	1.5U	I		
2,4,5-TP (Silvex)	50	21/24	22J	0.19/28	28	45J		
<b>Pesticides</b>								
alpha-BHC		60/77	84	88/110	65	150J		
beta-BHC		12 / 14	13	6.7J/10U	10	13		
delta-BHC		10U	3.5	10U	3	3J		
gamma-BHC (Lindane)	0.2	98/120	110	150/180	120	230		
4,4'-DDD		20U	.5U	20U	.6U	2K		
4,4'-DDE		20U	.5U	20U	.41U	2K		
4,4'-DDT		20U	.5U	20U	.26U	2K		
Aldrin		10U	25U	10U	.35U	1K		
Dieldrin		20U	1.6	20U	.89U	2K		
Endrin	2		.5U	NA	.2U	2K		
Endosulfan I			0.62		.09U	1K		
Endrin Ketone					.05U	2K		
Chlordane	2		NA	NA	.2U	1K		
Heptachlor	0.4		0.48	NA	.09U	1K		
Methoxychlor	40			NA	.1U	10K		
Toxaphene	3		5U	NA	5U	100K		
<b>Volatile Organics</b>								
Vinyl Chloride	2	U	17U	U	4J	10K		
Acetone		10U/62	17U	10U	6U	25J		
Carbon Disulfide		U	8.3U	5U	1U	10K		
1,1-Dichloroethene	7	U	8.3U	U	1U	10K		
1,1-Dichloroethane				U	1	10K		
1,2-Dichloroethene	170*	U	8.3U	5U	1U	10K		
Chloroform		U	8.3U	U	1	10K		
1,2-Dichloroethane	5	U	10	U/7	8	10K		
Trichloroethene	5	U/6.1	8.3U	7.8/8.9	10	10K		
1,1,1-Trichloroethane	200			8.5U	8.5U	10K		
1,1,2-Trichloroethane	[5]	U/9.9	8.3U	7.6/11	13J	10K		
Benzene	5	U	8.3U	5U	6	10K		
Tetrachloroethene	5	U	8.3U	U	1U	10K		
Toluene	1000	U	8.3U	U	1U	10K		
Chlorobenzene	100	120/270	190	200/250	260	220		
Ethylbenzene	700	U	8.3U	5U	1U	10K		
4-Methyl-2-Pentanone				10U				
Xylene (Xylol)	10000	5U	8.3U	5U	1U	10K		
<b>Semivolatiles</b>								
1,4-Dichlorobenzene	75	NS	NS	NS	22	NS		
<b>Metals</b>								
Total Arsenic	50	10300/16400	21000	12000/15000U	16400	14000		
Dissolved Arsenic		8500/15100	14000	12500/30000U	15500	12000		

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-20 (Page 1)

Analyte (ug/L)	MCL	WCC 1983	WCC 1984	WCC 1985	WCC 1986	WCC 1987	WCC 1988
<b>Herbicides</b>							
2,4,5-T		5U	1U	1U	1U	1U	1U
2,4-D	70	5U/5.7	1U	1U	1U	1U	1U
2,4,5-TP (Silvex)	50						
<b>Pesticides</b>							
alpha-BHC							
beta-BHC							
delta-BHC							
gamma-BHC (Lindane)	0.2	.1U	1U/0.38	28U/0.45	0.38	55/1.83	1/.60
4,4'-DDD		1U	.1U/0.15	.1U	.1U	.1U	.1U
4,4'-DDE		1U	.1U/0.13	.1U	.1U	.1U	.1U
4,4'-DDT		1U	.1U/0.16	.1U	.1U	.1U	.1U
Aldrin		.1U	.1U	.1U	.1U	.39/.50	.24/.56
Dieldrin		1U	.1U/0.17	.1U	.1U	.1U	.1U/.33
Endrin	2	1U/358	.1U	.1U	.1U		
Chlordane	2	5U	5U	.1U	.1U		
Heptachlor	0.4	1U/0.6	.1U	.1U	.1U		
Methoxychlor	40	5U	5U	5U	5U		
Toxaphene	3	5U	5U	5U	5U		
<b>Volatile Organics</b>							
Acetone							
Carbon Disulfide							
1,1-Dichloroethene	7						
1,2-Dichloroethene	170*						
Chloroform							
1,2-Dichloroethane	5						
1,1,2-Trichloroethane	[5]						
Trichloroethene	5						
Tetrachloroethene	5						
Benzene	5						
Chlorobenzene	100						
Ethylbenzene	700						
Xylene (Xylol)	10000	1U	1U	1U	1U	1U	1U
<b>Metals</b>							
Total Arsenic	50	12/63	8.9/46	5/6	11		
Dissolved Arsenic						10U	10U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-20 (Page 2)

Analyte (ug/L)	MCL	WCC 1989	WCC 1990	WCC 1991	WCC 1992	EPA Jun-92	WCC 1993
<b>Herbicides</b>							
2,4,5-T		U	.2U	.2U	.2U	NS	
2,4-D	70	U	1.2U	1.2U	1.4U	NS	
2,4,5-TP (Silvex)	50		.17U	.17U	.17U	NS	
<b>Pesticides</b>							
alpha-BHC			0.15	0.26/0.30	0.088/0.23	NS	
beta-BHC			.05U	.05U	.05U	NS	
delta-BHC			0.12	.1U/0.29	.05U	NS	
gamma-BHC (Lindane)	0.2	U	.47/1.1	.0.84/0.99	.0.24/0.72	NS	
4,4'-DDD		U	.1U	.1U	.1U	NS	
4,4'-DDE		U	.1U	.1U	.1U	NS	
4,4'-DDT		U	.1U	.1U	.1U	NS	
Aldrin		U	.05U	.05U	.05U	NS	
Dieldrin		U	.1U	.1U	.1U	NS	
Endrin	2			NA	NA	NS	
Chlordane	2				NA	NS	
Heptachlor	0.4			NA	NA	NS	
Methoxychlor	40			NA	NA	NS	
Toxaphene	3			NA	NA	NS	
<b>Volatile Organics</b>							
Acetone				100U/250	120U	3U	
Carbon Disulfide				U	50U	1U	
1,1-Dichloroethene	7			U	U	3 {4}	
1,2-Dichloroethene	170*			50U	50U	1U {1}	
Chloroform				U	U	1 {1}	
1,2-Dichloroethane	5			50U	50U	1U	
1,1,2-Trichloroethane	[5]			50U	50U	3J {3J}	
Trichloroethene	5			1500/2100	1300/4200	600J {400J}	
Tetrachloroethene	5			U	U	1 {1}	
Benzene	5			U	50U	1 {1}	
Chlorobenzene	100			5U	50U	2 {2}	
Ethylbenzene	700			U	50U	1U	
Xylene (Xylol)	10000	U	50U	5U/100U	50U	1U	
<b>Metals</b>							
Total Arsenic	50	6	5U	5U	5U	NS	
Dissolved Arsenic			5U	5U	5U	NS	

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-23

Analyte (ug/L)	MCL	WCC Nov. 1983	WCC Aug. 1985	WCC No data for 1986-1991			WCC 1992
Herbicides							
2,4,5-T		5U	1U				.2U/1U
2,4-D	70	5U	1U				1.2U/6U
2,4,5-TP (Silvex)	50	NA	NA				0.95/2.5
Pesticides							
alpha-BHC							0.25/0.41
beta-BHC							1.3/2.4
delta-BHC							0.32/0.48
gamma-BHC (Lindane)	0.2	11.1	0.17				0.27/0.37
4,4'-DDD		2.1	.1U				0.53/1.1
4,4'-DDE		1U	.1U				0.46/1.1
4,4'-DDT		1U	.1U				.4U/1.5
Aldrin		3	.1U				0.38/1.3
Dieldrin		4.7	.1U				2.3/2.6
Diazinon		NA	NA				NA
Endrin	2	.1U	.1U				.4U/0.73
Chlordane	2	5U	.1U				.5U
Heptachlor	0.4	.1U	.1U				.05U
Methoxychlor	40	5U	5U				.5U
Toxaphene	3	5U	5U				5U
Malathion		NA	NA				
Parathion, Ethyl		NA	NA				
Parathion, Methyl		NA	NA				
PCB	0.5	NA	NA				
Volatile Organics							
Acetone							10U
Carbon Disulfide							5U/22
1,2-Dichloroethene	170*						5U
1,1,1-Trichloroethane	200						5U
1,1,2-Trichloroethane	[5]						5U
1,2-Dichloroethane							5U
2-Butanone (MEK)							10U
Trichloroethene	5						5U
Benzene	5						5U
Chlorobenzene	100						5U
Ethylbenzene	700						5U
4-Methyl-2-Pentanone							10U
Xylene (Xylol)	10000	1U	1U				5U
Metals							
Total Arsenic	50	9	1				25/69
Dissolved Arsenic		NA	NA				5U

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-24

Analyte (ug/L)	MCL	WCC 1987	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992	WCC 1993
<b>Herbicides</b>								
2,4,5-T		1U	1U	U	.2U	.2U	.2U	
2,4-D	70	1U	1U	U	1.2U	1.2U	1.2U	
2,4,5-TP (Silvex)	50				.17U	.17U	.17U	
<b>Pesticides</b>								
alpha-BHC					0.056	.060/0.064	0.062/0.08	
beta-BHC					.05U	.05U/0.068	.05U/0.073	
delta-BHC					.05U	.05U	.05U	
gamma-BHC (Lindane)	0.2	.1U	.1U	U	.05U	.05U	.05U	
4,4'-DDD		.1U	.1U	U	.1U	.1U	.1U	
4,4'-DDE		.1U	.1U	U	.1U	.1U	.1U	
4,4'-DDT		.1U	.1U	U	.1U	.1U	.1U	
Aldrin		.1U	.1U	U	.05U	.05U	.05U	
Dieldrin		.1U	.1U/.63	U	.1U	.1U	.1U	
Endrin	2						NA	
Chlordane	2						NA	
Heptachlor	0.4						NA	
Methoxychlor	40		.5U	U			NA	
Toxaphene	3		5U	U			NA	
<b>Volatile Organics</b>								
Acetone						10U/13	10/23	
Carbon Disulfide						U	5U	
1,2-Dichloroethene	170*					U	5U	
1,1,1-Trichloroethane	200					U	5U	
1,1,2-Trichloroethane	[5]					5U	5U	
1,2-Dichloroethane	5					U	5U	
2-Butanone						U	10U	
Trichloroethene	5					5U	5U	
Benzene	5					5U	5U	
Chlorobenzene	100					5U	5U	
Ethylbenzene	700					5U	5U	
Xylene	10000	1U	1U	U	5U	5U	5U	
<b>Metals</b>								
Total Arsenic	50				5U	5U	5U	
Dissolved Arsenic		10U	10U	U	5U	5U	5U	

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-25

Analyte (ug/L)	MCL	WCC 1987	WCC 1988	WCC 1989	WCC 1990	WCC 1991	WCC 1992
<b>Herbicides</b>							
2,4,5-T		1U	1U		.2U	.2U	.2U
2,4-D	70	1U	1U		1.2U	1.2U	1.2U
2,4,5-TP (Silvex)	50				.17U	.17U	.17U
<b>Pesticides</b>							
alpha-BHC						.05U	.05U
beta-BHC						.05U	.05U
delta-BHC						.05U	.05U
gamma-BHC (Lindane)	0.2	1U/.53	.1U	0.15	.05U	.05U	.05U
4,4'-DDD		.1U	.1U		.1U	.1U	.1U
4,4'-DDE		.1U	.1U		.1U	.1U	.1U
4,4'-DDT					.1U	.1U	.1U
Aldrin		.1U	.1U		.05U	.05U	.05U
Dieldrin		.1U	.1U		.1U	.1U	.1U
Endrin	2				.1U	NA	NA
Chlordane	2				.5U	NA	NA
Heptachlor	0.4				.05U	NA	NA
Methoxychlor	40				1U	NA	NA
Toxaphene	3				1U	NA	NA
<b>Volatile Organics</b>							
Acetone						10U	10U
Carbon Disulfide						U	5U
1,2-Dichloroethene	170*					5U	5U
1,2-Dichloroethane	5					5U	5U
1,1,1-Trichloroethane	200					U	U
1,1,2-Trichloroethane	[5]					5U	5U
Trichloroethene	5					5U	5U
Benzene	5					U	5U
Chlorobenzene	100					5U	5U
Ethylbenzene	700					U	5U
Xylene	10000	1U	1U		5U	5U	5U
<b>Metals</b>							
Total Arsenic	50			9	5U	5U	5U
Dissolved Arsenic		10U	10U		5U	5U	5U



Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-26

Analyte (ug/L)	MCL	WCC 1989	WCC 1990	WCC 1991	WCC 1992	WCC 1993
<b>Herbicides</b>						
2,4,5-T		10U	.2U	.2U	.2U	
2,4-D	70	20U	1.2U	1.2U	1.2U	
2,4,5-TP (Silvex)	50	NA	.17U	.17U	.17U	
<b>Pesticides</b>						
alpha-BHC		NA	.05U	.05U	.05U	
beta-BHC		NA	.05U	.05U	.05U	
delta-BHC		NA	.05U	.05U	.05U	
gamma-BHC (Lindane)	0.2	.05U	.05U	.05U	.05U	
4,4'-DDD		.1U	.1U	.1U	.1U	
4,4'-DDE		.1U	.1U	.1U	.1U	
4,4'-DDT		.1U	.1U	.1U	.1U	
Aldrin		.05U	.05U	.05U	.05U	
Dieldrin		.1U	.1U	.1U	.1U	
Endrin	2	.1U			NA	
Chlordane	2				NA	
Heptachlor	0.4	.05U			NA	
Methoxychlor	40	.5U			NA	
Toxaphene	3	1U			NA	
<b>Volatile Organics</b>						
Acetone				10U	10U	
Carbon Disulfide				U	5U	
1,2-Dichloroethene	170*			U	5U	
1,1,1-Trichloroethane	200			U	5U	
1,1,2-Trichloroethane	[5]			5U	5U	
1,2-Dichloroethane	5			U	5U	
2-Butanone (MEK)				U	10U	
Trichloroethene	5			5U	5U	
Benzene	5			U	5U	
Chlorobenzene	100			5U	5U	
Ethylbenzene	700			U	5U	
Xylene	10000	5U	5U	5U	5U	
<b>Metals</b>						
Total Arsenic	50	U, {10}	5U	5U	5U	
Dissolved Arsenic		U, {16}	5U	5U	5U	

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-27

Analyte (ug/L)	MCL	WCC 1989	WCC 1990	WCC 1991	WCC 1992	EPA Dec-92	WCC 1993
<b>Herbicides</b>							
2,4,5-T		10U	.2U	.2U	.2U	NS	
2,4-D	70	20U	.5U	1.2U	1.2U	NS	
2,4,5-TP (Silvex)	50	10U	.17U	.17U	.17U	NS	
<b>Pesticides</b>							
alpha-BHC		NA	0.12	.066/0.12	.05U	NS	
beta-BHC		NA	.05U	.05U	.05U	NS	
delta-BHC		NA	.05U	.05U/0.064	.05U	NS	
gamma-BHC (Lindane)	0.2	.09/.11, { .05U }	0.14/0.22, { 0.15 }	0.12/0.23	.05U/0.066	NS	
4,4'-DDD		.1U	.1U	.1U	.1U	NS	
4,4'-DDE		.1U	.1U	.1U	.1U	NS	
4,4'-DDT		.1U	.1U	.1U	.1U	NS	
Aldrin		.05U	.05U	.05U	.05U	NS	
Dieldrin		.1U	.1U	.1U	.1U	NS	
Endrin	2	.1U	.1U	.1U	.1U	NS	
Chlordane	2	.05U	.05U	.05U	.05U	NS	
Heptachlor	0.4	.05U	.05U	.05U	.05U	NS	
Methoxychlor	40	.5U	.5U	.5U	.5U	NS	
Toxaphene	3	1U	1U	5U	5U	NS	
<b>Volatile Organics</b>							
Acetone				5U	5U	I	
Carbon Disulfide				U	5U	1K	
1,2-Dichloroethene	170*			U/9.8	5U	2.1	
1,1,2-Trichloroethane	[5]			5U	5U	1K	
1,2-Dichloroethane	5			U	5U	1K	
Trichloroethene	5			5U/10	5U/19	5.9	
Benzene	5			U	5U	1K	
Chlorobenzene	100			5U	5U	1K	
Ethylbenzene	700			U	5U	1K	
Xylene	10000	5U	5U	5U	5U	1K	
<b>Metals</b>							
Total Arsenic	50	3U	5U	5U	6.6/55	NS	
Dissolved Arsenic		3U	5U	5U	5U	NS	

Historical Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-28

Analyte (ug/L)	MCL	WCC 1989	WCC 1990	EPA Jun-90	WCC 1991	EPA Jun-91	WCC 1992	EPA Jun-92
<b>Herbicides</b>								
2,4,5-T		10U	.2U	.2U	.2U	3.9U	.2U	.2U
2,4-D	70	20U	.5U	1U	1.2U	15U	1.2U/1.5,{1.2U}	.5U
2,4,5-TP (Silvex)	50	10U	.17U	.2U	.17U	1.1U	.17U	.15U
<b>Pesticides</b>								
alpha-BHC		NA	1.8	1.6U	1.8/1.9,{1.5/1.8}	1.8U	1.8/2.1,{1.6/2}	1.9
beta-BHC		NA	.2U	.6U	.2U	.5U	.2U	.11U
delta-BHC		NA	0.36	0.14	.38/.53,{.34/.50}	.5U	.37/.47,{.33/.45}	0.43
gamma-BHC (Lindane)	0.2	7/4.1,{3.4/3.9}	3.5/3.9	3.2	3.2/4.1,{3.1/3.5}	3.3U	3.4/4,{3.0/4.2}	3.5
4,4'-DDD		.4U	.4U	.12U	.4U	1U	.4U	0.032
4,4'-DDE		.4U	.4U	.12U	.4U	1U	.25U,{.4U}	.006U
4,4'-DDT		.4U	.4U	.12U	.4U	1U	.4U	0.04
Aldrin		.2U	.05U	.5U	.2U	.5U	.2U	.004U
Dieldrin		.4U	.4U	0.12	.4U	1U	.4U	0.05
Endrin	2	.4U		.12U	.4U	1U	.4U	.02U
Endosulfan I						.5U		.009U
Endrin Ketone								.038U
Chlordane	2	2U	.2U	.5U	.2U	NA	.25U	.02U
Heptachlor	0.4	.2U			.2U	.5U	.2U	.009U
Methoxychlor	40	2U	2U	.6U	2U		2U	.01U
Toxaphene	3	4U	4U		20U	10U	20U	.5U
<b>Volatile Organics</b>								
Vinyl Chloride	2				U	10U	U	3U
Acetone				10U	5.1 {10U}	10U	10U	2U
Carbon Disulfide					U	5U	5U/6.8, {5U}	1U
1,1-Dichloroethene	7				U	5U	U	1U
1,2-Dichloroethene	170*				5U	5U	5U	1U
Chloroform					U	5U	U	1
1,2-Dichloroethane	5				5U	5U	5U	1U
Trichloroethene	5			5U	5U	5U	5U	1U
1,1,2-Trichloroethane	[5]			5U	5U	5U	5U	1U
Benzene	5				U	5U	5U	1U
Tetrachloroethene	5				U	5U	U	1U
Toluene	1000				U	5U	U	2
Chlorobenzene	100			5U	5U	5U	5U	3
Ethylbenzene	700				U	5U	5U	1U
Xylene	10000	17,{8.7/17}	5U	5U	5.1/8.4,{5.0/9.0}	5U	5U	4
<b>Semivolatiles</b>								
None Detected		NS	NS	NS	NS	NS	NS	U
<b>Metals</b>								
Total Arsenic	50	35,{3U}	5U/8.6	10U	5U	10U	5U	50U
Dissolved Arsenic		3U	5U/8.8	10U	5U	10U	5U	50U

## Groundwater Data from the Ortho-Chevron Facility.

Well: OWC-29

Analyte (ug/L)	MCL	WCC 1992	EPA Aug-92	EPA Dec-92
Herbicides				
2,4,5-T		.2U	I	.2U
2,4-D	70	1.2U	I	.2U
2,4,5-TP (Silvex)	50	.17U	I	.2U
Pesticides				
alpha-BHC		0.25/0.26	0.23	0.38J
beta-BHC		.05U	0.005U	.05K
delta-BHC		.05U	0.008U	.05K
gamma-BHC (Lindane)	0.2	0.56/0.7	0.73	0.68
4,4'-DDD		.1U	0.06U	.1K
4,4'-DDE		.1U	0.006U	.1K
4,4'-DDT		.1U	0.01U	.1K
Aldrin		.05U	0.004U	.05K
Dieldrin		.1U	0.006U	.1K
Endrin	2	.1U	0.02U	.1K
Endosulfan I			0.009U	.05K
Endrin Ketone			0.005U	.1K
Chlordane	2	.5U	0.02U	.05K
Heptachlor	0.4	.05U	0.009U	.05K
Methoxychlor	40	.5U	0.01U	.5K
Toxaphene	3	5U	0.50U	5K
Volatile Organics				
Vinyl Chloride	2	U	3U	1K
Acetone		10U	20U	I
Carbon Disulfide		5U	1U	1K
1,1-Dichloroethene	7	U	1U	1K
1,1-Dichloroethane		U	1	1K
1,2-Dichloroethene	170*	31/34	1U	26
Chloroform		U	1U	1K
1,2-Dichloroethane	5	5U	1U	1K
Trichloroethene	5	5.2/6.4	6	5.2
1,1,2-Trichloroethane	[5]	5U	1U	1K
Benzene	5	5U	1U	1K
Tetrachloroethene	5	U	3	2.5
Toluene	1000	U	1U	1K
Chlorobenzene	100	5U	1U	1K
Ethylbenzene	700	5U	1U	1K
Xylene	10000	5U	1U	1K
Semivolatiles				
None Detected		NS	U	NS
Metals				
Total Arsenic	50	5U	50U	1U
Dissolved Arsenic		5U	50U	1.1U

## Notes:

Well drilled and first sampled in August 1992.

Metals Detected in U.S. EPA June 1991 Split Samples from Ortho-Chevron in Maryland Heights, Missouri.

Parameter		OWC-12A		OWC-18		OWC-19		OWC-28	
Lithology		Weath. Limestone		Limestone		Loess (Clayey Silt)		Limestone	
Temp. (C)		19.9		22		21.2		19.2	
pH		7.1		7.42		6.4		5.95	
Spec. Cond. (1)		722		637		1548		2580	
Metal ug/L	MCL (2)	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum		240	200U	310	200U	220	200U	12000	11000
Barium	1000	660	660	260	250	340	340	200U	200U
Cadmium	10	5U	5U	5U	5U	150	150	5.9	5.3
Iron		1900	230	480	100U	1100	630	390	100U
Manganese		3900	4000	690	630	7800	8000	12000	12000
Nickel		40U	40U	40U	40U	63	58	240	240
Lead	50	6.7	3U	3U	3U	3U	3U	3U	3U
Zinc		240	69	160	66	81	67	99	110
Metal mg/L									
Calcium		110	110	110	110	150	160	350	340
Magnesium		15	15	14	14	49	51	120	110
Sodium		16	17	11	12	76	79	59	58
Potassium		5U	5U	5U	5U	5U	5U	10	11

(1) Spec. Cond. = Specific Conductivity in umhos/cm.

(2) MCL = Maximum Contaminant Level according to Safe Drinking Water Act (SDWA) in 1991.

Metals Detected in U.S. EPA June and August 1992 Split Samples from Ortho-Chevron in Maryland Heights, Missouri.

Parameter		OWC-4		OWC-8		OWC-12A		OWC-18		OWC-19		OWC-28		OWC-29	
Lithology		Loess (Clayey Silt)		Loess (Clayey Silt)		Weath. Limestone		Limestone		Loess (Clayey Silt)		Limestone		Limestone	
Temp. (Celsius)		23.8		22.3		22.9		22.6		21.9		21.9		19	
pH		6.2		6.7		7.3		7.3		6.3		5.9		6.7	
Spec. Cond. (1)		2170		1202		706		630		1487		2280		2240	
Metal ug/L	MCL (2)	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum		305	50U	556	50U	128 {50U}	50U	911	50U	1140	50U	11600	10900	161	50U
Arsenic	50	50U	50U	51	61.5	50U	50U	50U	50U	16400	15500	50U	50U	50U	50U
Barium	2000	183	178	263	245	630 {500}	573 {589}	235	226	399	361	31.1	29.7	75.6	68.1
Beryllium	1	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	5.22	3.66	2U	2U
Cadmium	5	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	6.55	7.2	5U	5U
Chromium	100	10U	10U	10U	10U	10U	10U	16.9	10U	89.9	10U	10U	10U	10U	10U
Copper	1300(3)	11.5	10U	10.9	10U	37.7 {10U}	10U	10U	10U	10.3	10U	10U	10U	10U	10U
Iron		623	50U	1060	81.5	2260 {119}	50U	1800	50U	1410	154	232	50U	160	50U
Manganese		642	472	638	554	3870 {1370}	3610 {3610}	682	638	6280	6230	11500	10900	453	447
Nickel	100	24.9	29.6	345	334	20U	20U	20U	20U	61.9	59.8	214	209	20U	20U
Lead	15(3)	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U
Vanadium		10U	10U	10U	10U	10U	10U	10U	10U	11.2	10U	10U	10U	10U	10U
Zinc		57.8	29.5	42	20U	63.8 {23}	36.9 {20U}	45.5	20U	33.4	32.8	47	62	40	20U
Metals (mg/l)															
Calcium		118	114	195	183	116 {117}	111 {109}	163	106	169	161	331	315	376	374
Magnesium		33.7	33.6	29.9	29.1	15.6 {15.9}	15.2 {15.5}	16.1	14.1	56	54.9	110	109	64.1	63.6
Sodium		321	312	64.4	62.6	19 {19.2}	17.6 {18.2}	14	11.8	82.1	81	60.3	59	49.9	51.2
Potassium		2U	2.12	2.73	2.54	2U	2U	2U	2U	2U	2U	9.39	9.29	42.3	53.1

(1) Spec. Cond. = Specific Conductivity in umhos/cm corrected to 25 degrees Celsius.

(2) MCL = Maximum Contaminant Level according to Safe Drinking Water Act (SDWA), November 1992.

{Duplicate Sample}

(3) Action Levels

Metals Detected in U.S. EPA December 1992 Split Samples from Ortho-Chevron in Maryland Heights, Missouri.

Parameter		OWC-3		OWC-6		OWC-8		OWC-12A		OWC-17		OWC-19		OWC-29	
Lithology		Plastic Clay/Loess		Loess (Clayey Silt)		Loess (Clayey Silt)		Weathered Limestone		Loess (Clayey Silt)		Loess (Clayey Silt)		Limestone	
Temp. (Celsius)		16		10		10.2		13.9		11.7		10.5		16	
pH		6.4		6.8		7		7		6.8		6.7		6.6	
Spec. Cond. (1)		2000		1116		875		578		622		1139		1700	
Metal ug/L	MCL (2)	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum		180	47U	170	130	240	62	21U	47U	1000	47U	410	47U	130	79
Arsenic	50	1.1U	1.1U	8.9	4.5	130	94	1.7U	1.4	14	11	14000	12000	1U	1.1U
Barium	2000	270	270	170	150	210	210	580	600	130	100	290	310	61	57
Beryllium	1	1U	2.2U	1U	2.2U	1U	2.2U	1U	2.2U	1U	2.2U	1U	2.2U	1U	2.2U
Cadmium	5	2.5	6.2	2U	5.6U	2U	5.6U	2U	5.6U	2U	5.6U	2U	5.6U	2U	5.6U
Cobalt		3.1U	12U	7.8U	12U	14	13	2.8U	12U	14	14	8.1U	12U	2U	12U
Chromium	100	2U	10U	2U	10U	2U	10U	2U	10U	4.6U	10U	33	10U	2U	10U
Copper	1300(3)	7U	7.8U	6.3U	7.8U	19U	7.8U	14U	7.8U	25U	7.8U	11U	7.8U	8U	7.9
Iron		300J	82U	1100J	280	1100J	120	3100J	2600	10000J	7900	620J	60U	120U	22U
Manganese		580	530	5400	4700	1300	1200	3900	4100	18000	19000	3500	3800	340	310
Nickel	100	24J	32	65J	66	430J	410	22J	32U	47J	48	64J	58	7.3J	32U
Antimony	6	13U	75J	13U	67U	13U	67U	13U	67U	13U	67U	13U	90J	13U	110J
Lead	15(3)	2U	1.1U	6.7	1.1U	7.2	1.1U	2U	1.1U	6.9	1.1U	2.3	1.1U	2	1.1U
Selenium	50	3U	1.8J	3U	1.1U	3U	1.1U	3U	1.1U	3U	1.1U	3U	1.1U	3U	1.1U
Vanadium		1.6	11U	1U	11U	1.4	11U	1U	11U	2.8	11U	10	11U	2.3	11U
Zinc		36	15	25	10U	35	12	23	12	69	22	64	37	53	31
Mercury	2	.2U	.2U	.2U	.2U	.2U	.2U	.2U	.2U	.2U	.2U	.2U	.2U	.2U	0.33
Metals (mg/l)															
Calcium		180	180	120	120	170	180	110	110	160	160	170	170	390	360
Magnesium		65	62	36	35	29	28	16	16	53	52	57	56	68	62
Sodium		210	210	150	150	62	64	17	18	92	99	76	79	49	47
Potassium		1.4	1.3	1.5	1.7	1.8	2.2	0.57	1.1U	8.7	9	1.5	1.1	17	16

(1) Spec. Cond. = Specific Conductivity in umhos/cm.

(2) MCL = Maximum Contaminant Level according to Safe Drinking Water Act (SDWA), November 1992.

(3) Action Levels

Shading indicates concentrations in excess of MCL.

## APPENDIX B

Cross-Sections Annotated with Compounds Detected in 1992



Summary of Information Used to Prepare Cross-Sections for Ortho-Chevron Chemical Company, Maryland Heights Missouri.

Well	Surf. Elev.(1)	Surf. Elev.(2)	T/Csg. Elev.(3)	Bor. Depth	Screen Depth	Date/Type (10)	Lithologic Descriptions from WCC Boring Logs
1	541	540.6	542.33	23	13 - 23	2/81 PVC	0-16': SC; 16-23': PC.
2	541	540.3	541	69.5	59.5 - 69.5	2/81 PVC	0-16': SC; 16-35': PC; 35-46': Clay with fine Sand 46-47.5': Ls; 47.5-61.5': calcareous Shale; 61.5-69.5': Ls.
3	529	529	531.22	35	15 - 35	2/81 PVC	0-4': Fill; 4-19': SC; 19-35': PC; 35': Auger Refusal, T/Ls (?)
4	519	518.6	520.55	29.5	9.5 - 29.5	2/81 PVC	0-4': Fill; 4-19': SC; 19-29.5': PC; 29.5': Auger Refusal, T/Ls (?)
5	515	515	N/A	26.5	15 - 25	2/81 PVC	0-3': Fill; 3-22': SC; 22-26.5': PC.
6	523	522.8	524.45	26.5	8 - 25	2/81 PVC	0-4.5': Fill; 4.5-19.5': SC; 19.5-26.5': PC.
7	523	522.4	524.19	17	7 - 17	2/81 PVC	0-6': Fill; 6-17': SC.
8	523	522.5	524.61	27.5	18.5 - 27.5	2/81 PVC	0-5.5': Fill; 5.5-23': SC; 23-27.5': PC.
9	532	532.1	533.76	44	12 - 32	2/81 PVC	0-2.5': Fill; 2.5-13': SC; 13-28.5': PC; 28.5-44': shly/sdy Clay; 44': Auger Ref. T/Ls (?)
10	528	528	533.08	36.8	13 - 28	2/81 PVC	0-5.5': Fill; 5.5-33': SC; 33-36.8': PC; 36.8': Ls.
11	524	N/A	N/A	35	18 - 28	2/81 PVC	0-6': Fill; 6-26': SC; 26-35': PC; 35': Auger Refusal, T/Ls (?)
12	524	N/A	N/A	40.3	30.3 - 40.3	2/81 PVC	0-6': Fill; 6-22': SC; 22-31': PC; 31-40.3': Ls with clay seams.
12A	523.2	523.2	524.56	48	41 - 46	10/83 SS	0-6': Fill; 6-24': SC; 24-31': PC; 31-48': Ls with clay seams.
13	516	518.19	518.19 (4)	21.5	10 - 20	2/81 PVC	0-3.5': Fill; 3.5-20': SC; 20-21.5': PC.
14	513	517.33	517.33 (5)	23.5	12 - 22	2/81 PVC	0-2.5': Fill; 2.5-18.5': SC; 18.5-23.5': PC.
15	514	515.19	515.19 (6)	21.5	10 - 20	2/81 PVC	0-14': SC; 14-21.5': PC.
16	522.5	522	522.97	19	9 - 19	7/81 PVC	0-3.5': Fill; 3.5-19': SC.
17	522.1	525.6*	523.23	18	8 - 18	7/81 PVC	0-7': Fill (with cinders); 7-18': SC.
18	519.2	519.96	519.96 (7)	76	56 - 76	7/81 PVC	0-7': Fill; 7-22': SC; 22-27': PC; 27-37': weathered/clayey Ls; 37-76: fractured Ls.
19	516	517.96	517.96 (8)	18	8 - 18	10/83 SS	0-4': Fill; 4-18': SC.
20	518.8	518.8	521.67	48.5	42 - 47	10/83 SS	0-2': Fill; 2-19': SC; 19-28': PC; 28-48.5': Ls with clay.
21	523.7	523.3	525.36	11	6.6 - 10.6	10/83 SS	0-6': Fill; 6-11': SC.
22	523.8	524	525.67	20	15.6 - 17.6	10/83 SS	0-6': Fill; 6-20': SC.
23	523.6	523.5	524.05 (9)	26	23.2 - 25.2	10/83 SS	0-6': Fill; 6-21': SC; 21-26': PC.
24	513.25	515.3	515.18	21	8.8 - 17.8	7/87 PVC	0-3.5': Fill; 3.5-21': SC.
25	513.34	513.3	515.18	48	36.2 - 46.2	7/87 PVC	0-6': Fill; 6-22': SC; 22-28': PC; 28-33': weathered Ls; 33-48': Ls with clay seams.
26	514.38	514.1	516.24	21.5	10.8 - 19.8	4/89 PVC	0-15.5': SC; 15.5-21.5': PC.
27	513.95	513.8	516.1	45	34.2 - 43.2	4/89 PVC	0-15.5': SC; 15.5-28': PC; 28-45': Ls (Shale parting at 31.5').
28	519.82	519.8	522.07	50	37.2 - 46.2	4/89 PVC	0-8.5': Fill; 8.5-32.5': SC; 32.5-50': Ls (Sh parting at 47.5').
29	511.26	Not Applicable	513.18	46	35.3 - 45.3	8/92 PVC	0-15': SC; 15-31': PC; 31-46': Ls (34.6-35.3': weathered w/ Shale partings; 42.3': calcite dissolution; 44.3-45.1': vertical fractures. 45.3': Shale partings).

Notes:

(1) MSL elevation at ground surface per WCC completion diagrams. (2) MSL ground elevations per WCC June 10, 1992 modification proposal.

(3) MSL elevation at top of well casing. (4) 517.54', (5) 512.89', (6) 515.2', (7) 519.68', (8) 517.03', and (9) 525.07' prior to 1991(capping/stormsewer construction).

(10) Date well was installed/ Type of casing Material: stainless steel or PVC Pipe.

Note that revised T/casings equal June 10 surface elevations for wells OWC-13, OWC-14, OWC-15, OWC-18, and OWC-19.

Lithologic Descriptions: SC = Silty Clay (low plastic) probably Peoria Loess PC = Plastic Clay (highly plastic) probably Roxana Loess Ls = Limestone (Mississippian).

Well information from Woodward-Clyde Consultants reports. Boring logs used for depth/lithology; installation diagrams for screen and ground elevation.

Top of casing elevations from WCC 1992 Annual report on groundwater monitoring. Cross-sections use ground elevation per completion diagrams due to later construction.

\* Surface elevation per June 10 1992 letter greatly exceeds T/Casing in October 1992 Annual Report.

## LEGEND FOR 1992 CHEMICAL CROSS-SECTIONS

### HERBICIDES

2,4-D = 2,4-Dichlorophenoxy acetic acid

2,4,5-T = 2,4,5-Trichlorophenoxy acetic acid

Sil = Silvex; 2,4,5-TP; or 2-(2,4,5-trichlorophenoxy)propionic acid

### PESTICIDES

BHCs = Benzene hexachloride isomers (alpha, beta, delta)

Lin = Lindane (gamma BHC)

DDD = 4,4'-DDD or 4,4'-dichlorodiphenyldichloroethane

DDE = 4,4'-DDE or 4,4'-dichlorodiphenyldichloroethylene

DDT = 4,4'-DDT or 4,4'-dichlorodiphenyltrichloroethane

Ald = Aldrin

Dld = Dieldrin

End = Endrin

ES = Endosulfan I

EK = Endrin ketone

HE = Heptachlor epoxide

HC = Heptachlor

Cld = Chlordane

MOC = Methoxychlor

### VOLATILE ORGANIC COMPOUNDS

VC = Vinyl chloride

CS<sub>2</sub> = Carbon disulfide

CM = Chloromethane

1,1-DCE = 1,1-Dichloroethene

1,2-DCE = 1,2-Dichloroethene

CHCl<sub>3</sub> = Chloroform

1,1-DCA = 1,1-Dichloroethane

1,2-DCA = 1,2-Dichloroethane

TCE = Trichloroethene

TCA = 1,1,1-Trichloroethane

1,1,2-TCA = 1,1,2-Trichloroethane

Benz = Benzene

PCE = Tetrachloroethene

Tol = Toluene

CB = Chlorobenzene

EB = Ethylbenzene

4M-2P = 4-Methyl-2-pentanone

Sty = Styrene

Xyl = Xylenes

### SEMI-VOLATILE ORGANIC COMPOUNDS

2-CP = 2-Chlorophenol

1,4-DCB = 1,4-Dichlorobenzene

1,2-DCB = 1,2-Dichlorobenzene

1,2,4-TCB = 1,2,4-Trichlorobenzene

4C3MP = 4-Chloro-3-methyl phenol

B(2E)P = Bis(2-ethylhexyl) phthalate

Iso = Isophorone

Naph = Naphthalene

2-MNaph = 2-Methylnaphthalene

### METALS

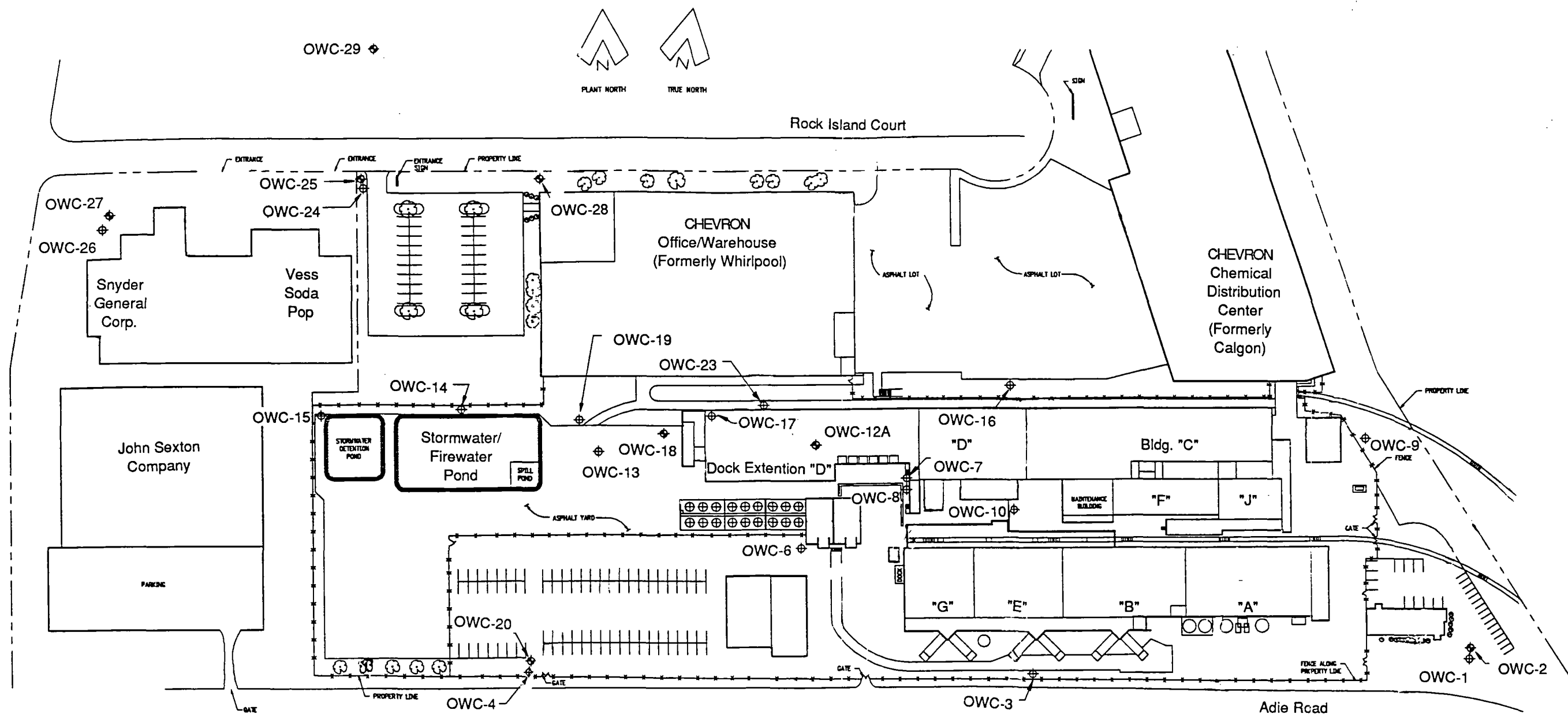
T/As = Total arsenic

D/As = Dissolved arsenic

Abd = Abandoned (wells OWC-21 and OWC-22 were abandoned in 1992)

N/S = Not sampled

Acetone and 2-butanone (MEK) are not included as they are common laboratory contaminants.

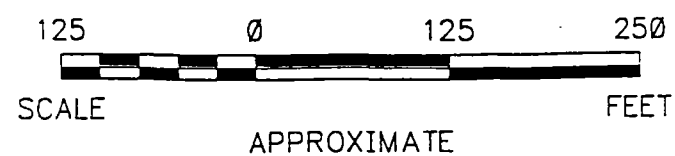


# LEGEND:

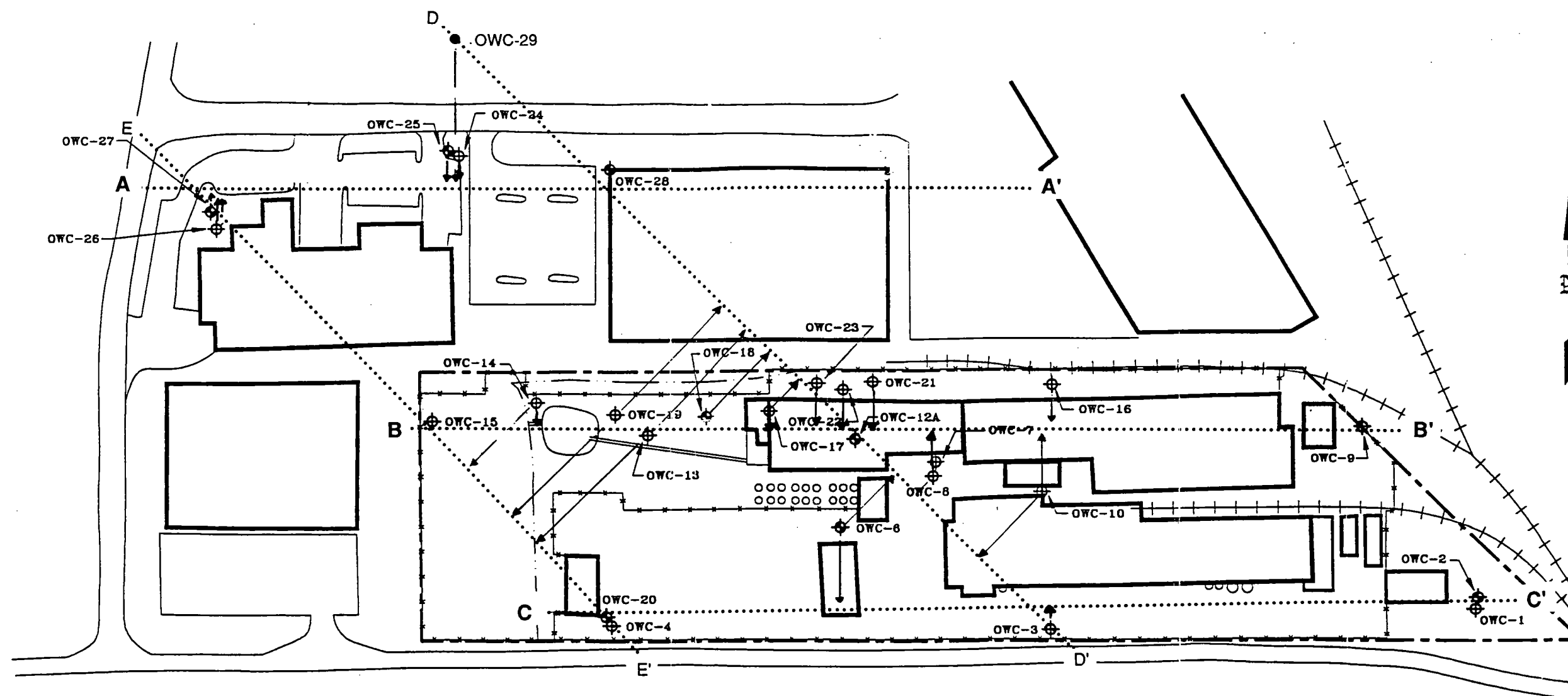
- PROPERTY FENCE
- FENCE LINE

## MONITORING WELL LOCATION AND NUMBER:

- ⊕ OWC-4 SHALLOW MONITORING WELL
- ⊕ OWC-20 DEEP MONITORING WELL



SITE MAP		
ORTHO-CHEVRON CHEMICAL PLANT Maryland Heights, Missouri		
REF.: Woodward-Clyde Consultants, 1/93		
Scale: 1"=125'	Date: 3/93	Figure: 1



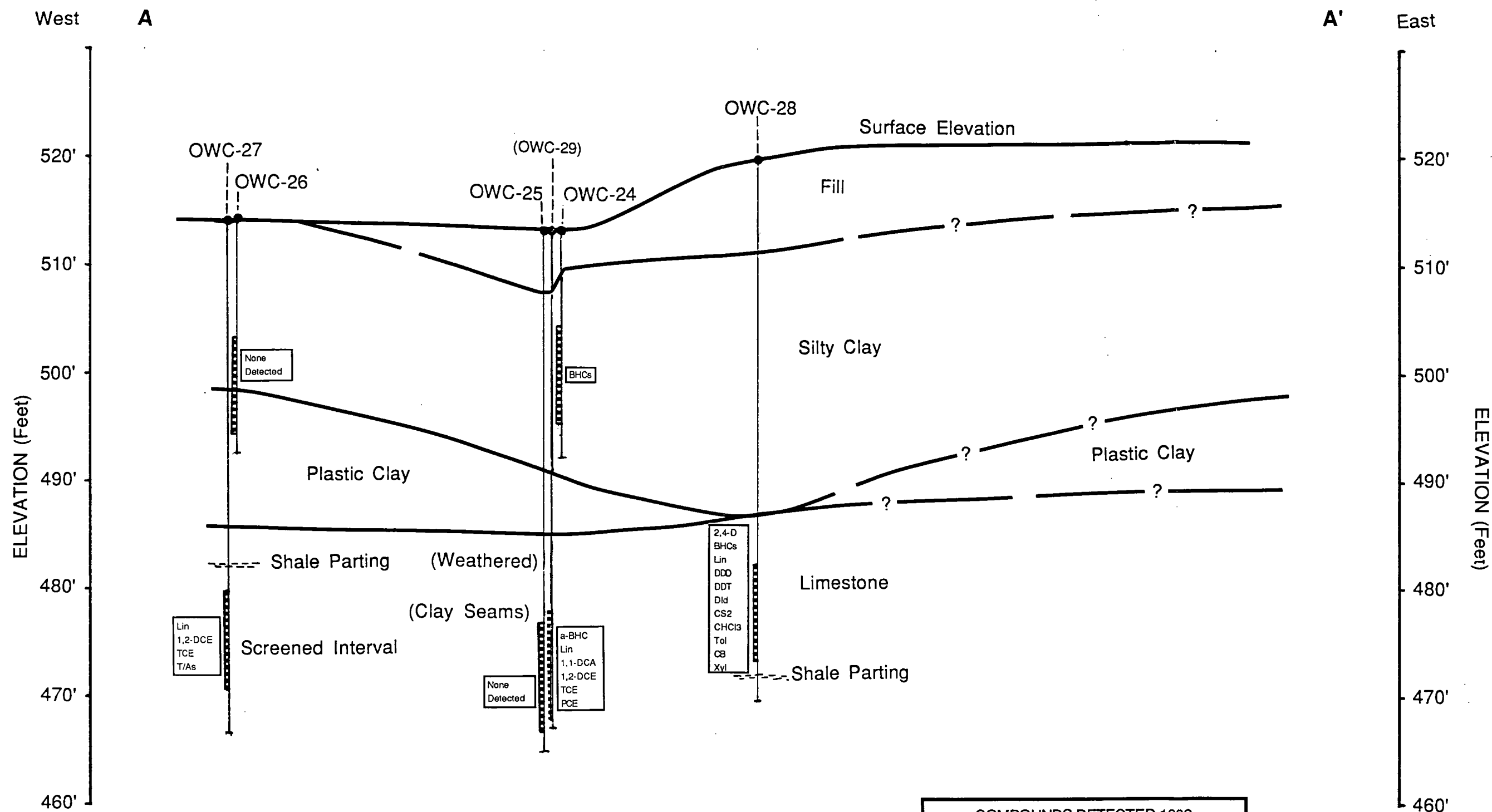
LEGEND	
Monitoring Well Location and Number	
	OWC-1 Shallow Monitoring Well
	OWC-2 Deep Monitoring Well
	OWC-29 Monitoring Well Installed August 1992
	Site Boundary
	Cross-Section
	Projection of Well to Cross-Section



CROSS-SECTION LOCATIONS ON FORMER WCC SITE MAP		
ORTHO-CHEVRON CHEMICAL PLANT Maryland Heights, Missouri		
REF.: Woodward-Clyde Consultants, 1/92		
Scale: 1"=150'	Date: 1/92 Rev: 3/93	Figure: 2

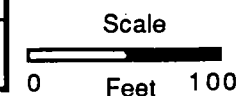
Note: Wells OWC-21 and OWC-22 were abandoned in 1992.

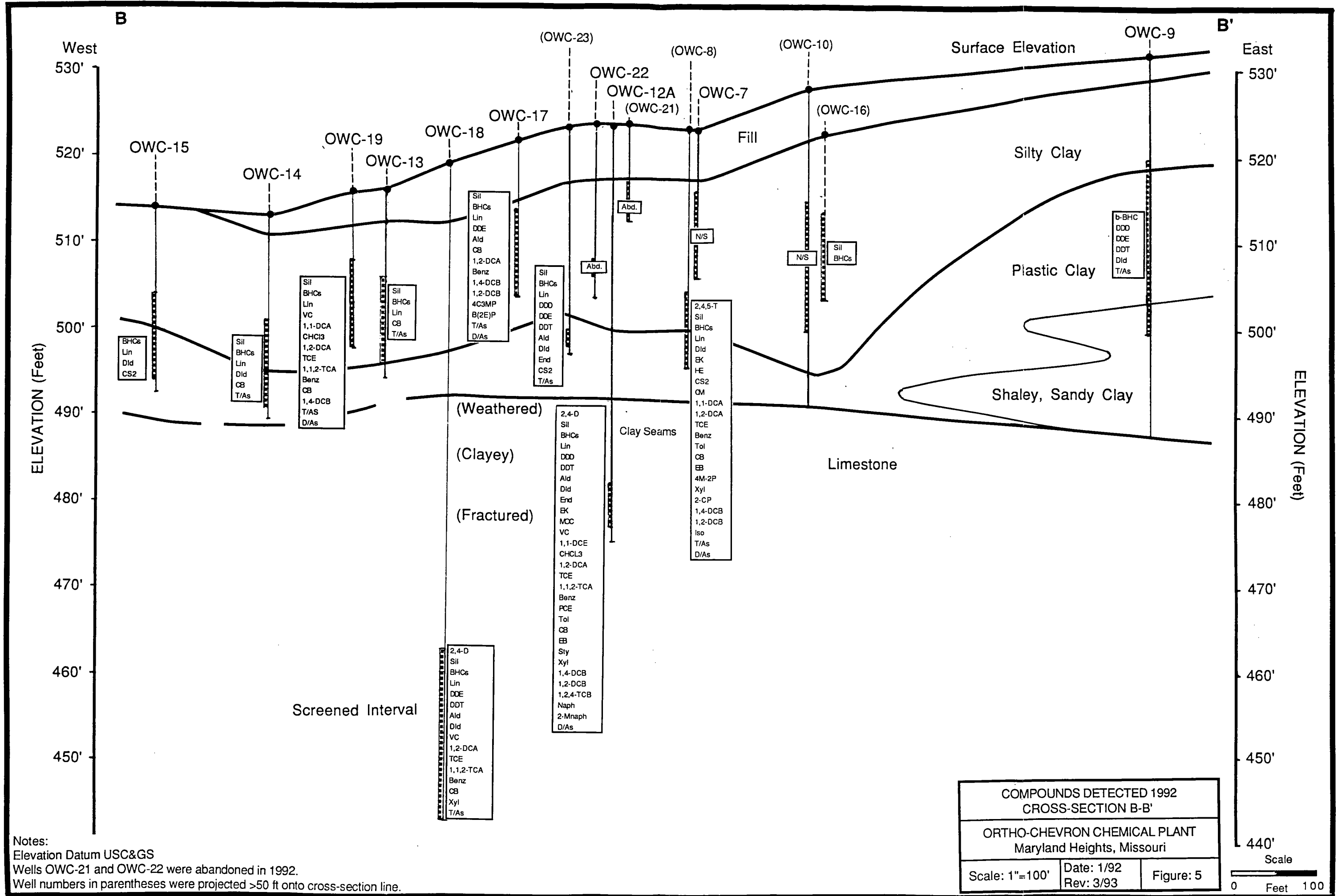


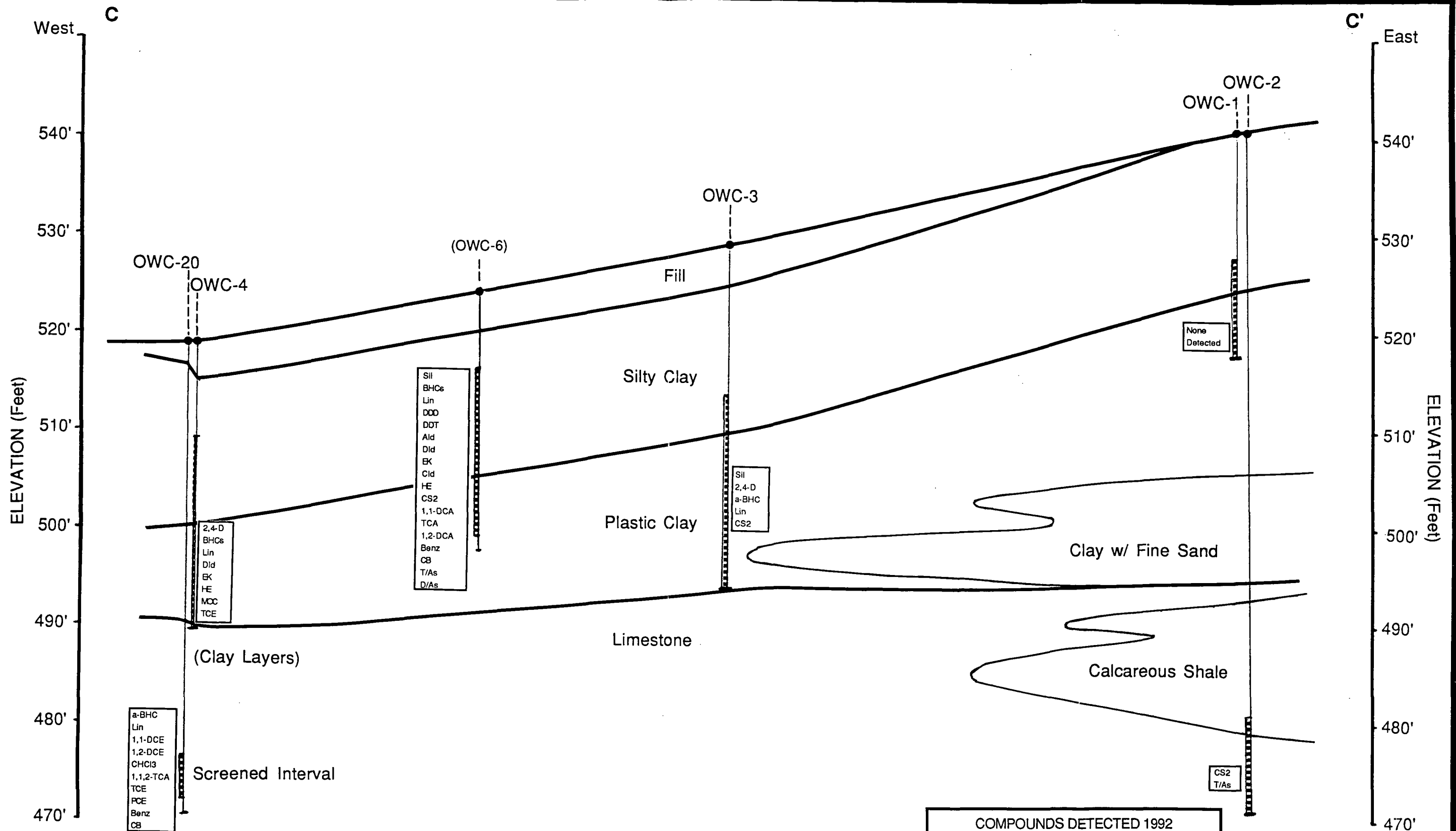


Notes:  
 Elevation Datum USC&GS  
 Well numbers in parentheses were projected >50 ft onto cross-section line.

COMPOUNDS DETECTED 1992 CROSS-SECTION A-A'		
ORTHO-CHEVRON CHEMICAL PLANT Maryland Heights, Missouri		
Scale: 1"=100'	Date: 1/92 Rev: 3/93	Figure: 4





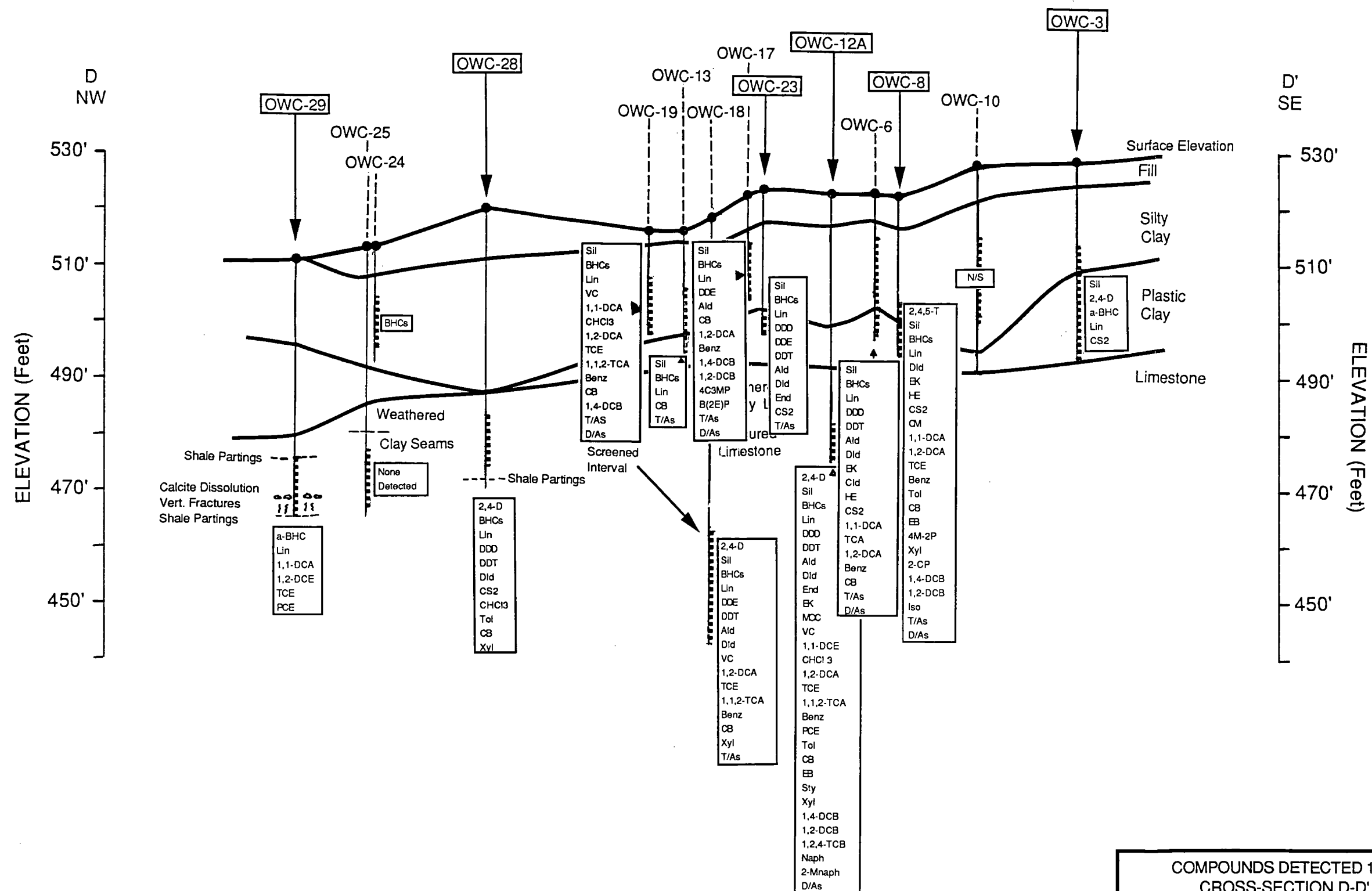


Notes:  
 Elevation Datum USC&GS.  
 Well numbers in parentheses were projected >50 ft onto cross-section line.

COMPOUNDS DETECTED 1992 CROSS-SECTION C-C'		
ORTHO-CHEVRON CHEMICAL PLANT Maryland Heights, Missouri		
Scale: 1"=100'	Date: 1/92 Rev: 3/93	Figure: 6

Scale  
 0 Feet 100





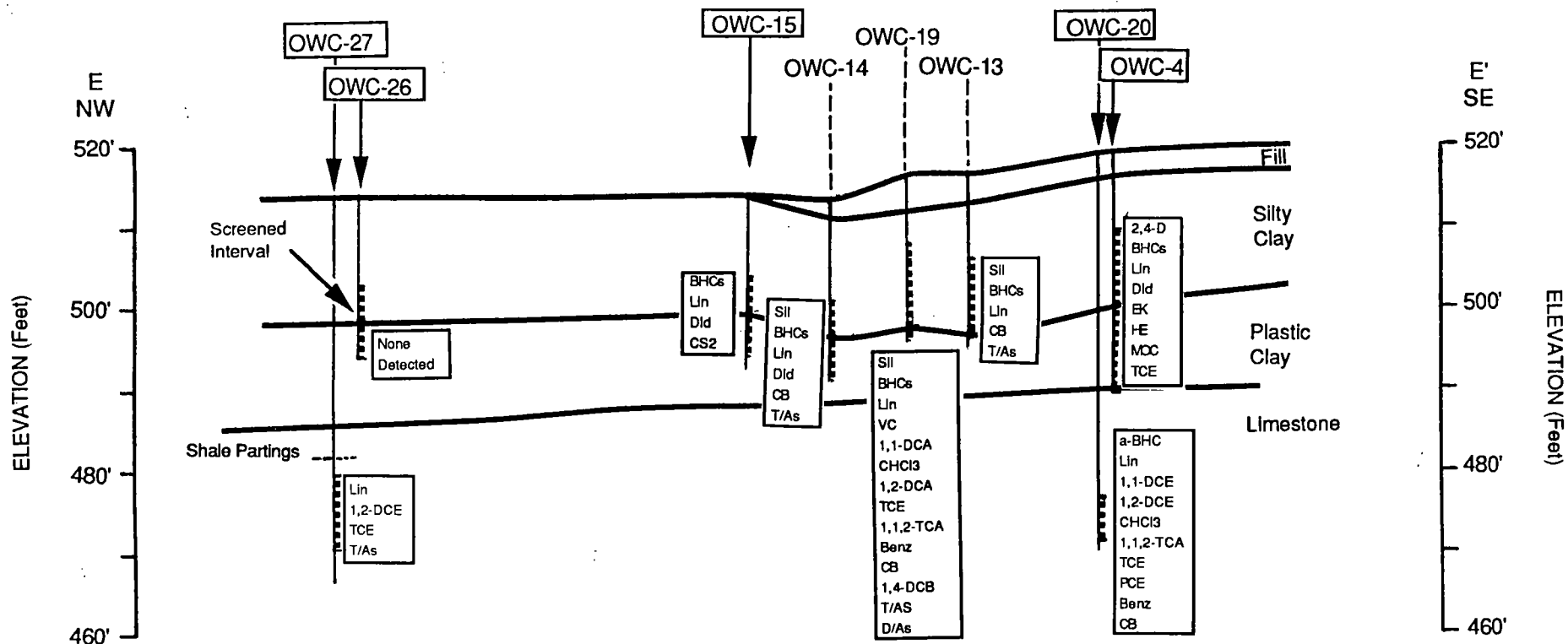
0' Scale 150'

Notes:  
Elevation Datum USC&GS  
Boxed well numbers indicate wells within 50 ft of cross-section line.

COMPOUNDS DETECTED 1992  
CROSS-SECTION D-D'

ORTHO-CHEVRON CHEMICAL PLANT  
Maryland Heights, Missouri

Scale: 1"=150' Date: 3/93 Figure: 7



0' Scale 150'

Notes:  
Elevation Datum USC&GS  
Boxed well numbers indicate wells within 50 ft of cross-section line.

COMPOUNDS DETECTED 1992 CROSS-SECTION E-E'		
ORTHO-CHEVRON CHEMICAL PLANT Maryland Heights, Missouri		
Scale: 1"=150'	Date: 3/93	Figure: 8